THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. VIII. No. 179—11th YEAR.] LONDON, AUGUST 30, 1859. [Subscription per Ann. 15s. in Advance / 18s Credit.] Price 8d. Unstamped.

TO GAS COMPANIES.

FIRE-CLAY Retorts and Fire Goods.

The Advertiser has brought his Fire-Clay Retorts to great perfection, both as to quality and finish. Many have stood three and four years.

Every description of Fire Goods in any quantity always on hand. The Fire Clay is the very best in the North of England. Stock never less than 10,000 tons weathering.

Orders promptly executed.

Apply, G. H. RAMSAY, of Derwenthaugh Fire-Brick Works, near NEWCASTLE-ON-TYNE.

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AN excellent Station-Meter, (by Cochrane, of Edinburgh,) with square Cast-Iron Case, 8 feet by 8 feet by 6 feet 8 inches high, with 10-inch Inlet, Outlet, and Bye-pass Valve complete. Will pass about 350,000 cubic feet per day, is in good order, and is parted with to make way for one of a larger size.

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Aug. 25, 1859.

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THE Blackburn Gaslight Company are prepared to receive TENDERS for the ERECTION, at their No. 2 Station, Addison Street, of a CIRCULAR ASHLER STONE TANK, the diameter of which to be 112 feet, and 30 feet 6 inches in depth, including also Dry Well, River and Retaining Walling in connexion with same.

Plans, Specification, and Conditions, can be inspected at the Company's Office, JUBILEE STREET.

All Tenders to be sent on or before the 26th of September, to CHRISTOPHER PARKINSON, Esq., Chairman to the Blackburn Gaslight Company.

ORLANDO BROTHERS, Gas Engineer.

Gas-Works, Blackburn, August 23, 1859.

CAUTION.

TO GAS-METER MANUFACTURERS AND OTHERS.

THE Undersigned hereby caution Meter Manufacturers and others against infringing the exclusive right of the Undersigned to the use of the Screw Adjustment for regulating the Height of the Overflow-Pipes in Wet Gas-Meters, as described in the Specification of the Letters Patent granted to Crosley and Goldsmith on the 19th of April, 1856: as well as against infringing any other portions of that or any other Patent of the said William Crosley; and

NOTICE is further given, that all Infringers of the said Inventions, or any portions of them, will be proceeded against.

CROSLEY & CO.,
103, SOUTHWARK BRIDGE ROAD,
LONDON, Aug. 29, 1859.

TO BE SOLD Cheap, a First-Rate Ten-Feet GASHOLDER, made expressly for Testing Meters or for Experimental purposes, with Cocks and Scale complete, &c.

Apply to H. ARMSTRONG, Manufacturer of every description of Gas Apparatus, 43, Manchester Street, GRAY'S INN ROAD.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE CLAY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire Bricks, and every other article in Fire Clay, are promptly executed at their Works as above.

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Coal and Coke Office,
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FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL AND CO.,
THE OLD TUBE WORKS,
CHURCH HILL, WEDNESBURY;
ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.

N.B. All Goods thoroughly Tested before sent out, and Warranted.

TO GAS MANAGERS.

WANTED, a person thoroughly con- versant with the Making and Distribution of Gas, with Main and Service Laying, Meter Inspecting, Keeping of Accounts, and all other duties connected with a small Work. A Cottage, with Coals and Gas, will be provided.

Applications and Testimonials, stating Salary expected, to be addressed to Mr. W. JONES, Secretary, Gas Company (Limited), Conway, NORTH WALES, on or before Friday the 2nd of September.

Conway, August 20, 1859.

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FOR SALE, a Three-Throw Pump GAS EXHAUSTER, nearly new, capable of passing 10,000 cubic feet of Gas per hour.

Also, a TABLE-ENGINE.—Cylinder, six inches diameter; Stroke, ten inches; with Fly-Wheel and Fittings complete.

Also, a STATION GAS-METER, capable of passing 10,000 cubic feet of Gas per hour.

For further particulars, apply to the SECRETARY of the Chester United Gas Company, CHESTER.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS, NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

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JAMES LAWRIE & CO.,
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TO GAS CONTRACTORS.

THE Queenstown Commissioners will receive TENDERS from parties willing to contract for LIGHTING ONE HUNDRED PUBLIC LAMPS with Gas of the best quality for THREE YEARS, from the 1st of JANUARY, 1860.

Particulars may be had on application to J. HAMMOND, Clerk Commrs., Commissioners' Office, No. 1, HARBOUR HILL.

Aug. 16, 1859.

THE Directors of the Godalming Gas- LIGHT COMPANY desire to receive TENDERS and PLANS for a set of THREE CAST-IRON DRY LIME PURIFIERS, 6 feet square, with Centre Valve, Lifting Apparatus for Covers, &c., complete.

Tenders to be forwarded to the SECRETARY on or before the 8th of September next.

The Directors do not bind themselves to receive the lowest or any Tender.

JOHN LAMBERT, Secretary.

THE ACT FOR
REGULATING MEASURES USED IN SALES OF GAS.

CROSLEY and CO.,
103, SOUTHWARK BRIDGE ROAD,
LONDON,
Are prepared to supply
STANDARD CUBIC FOOT MEASURES
of the capacity required by the 2nd Section of this Act, as well as
TEST-METERS and GASHOLDERS,
Accurately graduated thereby.

FIRE BRICKS.

THE MACHEN COLLIERY COMPANY, NEWPORT (MON.).

Suppers of Fire-Goods of First-class quality manufactured from a remarkably pure seam of Fire-Clay.

Railway Communication by Broad or Narrow Gauge with all parts of the Kingdom, and by Seaboard, Coastwise, and Foreign.

ROBERT MACLAREN and CO., FOLLINTON FOUNDRY, GLASGOW,

Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

LORD REDESDALE'S SALE OF GAS ACT.

WET AND DRY GAS-METER WORKS,

GREAT PETER STREET, WESTMINSTER.

THOMAS EDGE has the satisfaction to inform those Directors of Gas Companies who have favoured him with their Orders for his Patent Improved Wet Meters—of which he has sent out upwards of 80,000—that they will not require any alteration under the provisions of the Sale of Gas Bill; whereas the Common Meters in use in the United Kingdom which have been proved so susceptible of error in their measurement are required to be taken down and altered at considerable expense.

Thomas Edge begs to state that he is prepared to supply his Patent Meters, which meet the requirements of the Act, to any Company at the present time; and, so soon as arrangements are made in London to have Meters tested and stamped, he will then supply them to Country Gas Companies with the Legal Stamp affixed, ready for use.

JOURNAL OF GAS LIGHTING ONE PENNY NEWSPAPER

MEDALS AWARDED TO
THOMAS GLOVER'S
PATENT DRY GAS-METERS.

THOMAS GLOVER,

PATENT DRY GAS-METER MANUFACTURER,

SUFFOLK STREET, CLERKENWELL GREEN, AND
ALLEN STREET, GOSWELL STREET, E.C.
Established 1844.

LORD REDESDALE'S "SALE OF GAS BILL."

LONDON, August 15, 1859.

THOMAS GLOVER takes the earliest opportunity of intimating to Gas Companies and his other Customers that, as Lord Redesdale's "Sale of Gas Bill" has determined the unit of measurement, he is now prepared to supply his Patent Dry Gas-Meters guaranteed to meet all the legal requirements of that bill.

THOMAS GLOVER confines his sole attention to the business of Gas-Meter Making. The propriety of his doing so is satisfactorily proved by his success; and, without the practice of any quackery, or any attempt to delude the public by an absurd exhibition of "Old and New Valves," his Meters are in general use by the Metropolitan Gas and other Companies in this Country and abroad. For example, one Metropolitan Company have now in use above **12,500** of his Patent Dry Gas-Meters; some of these Meters have been fixed for Fourteen Years, and are still in working order, without complaint from either the Company or the Consumer.

THOMAS GLOVER thinks it necessary to put Gas Companies on their guard against parties selling Patent Dry Gas-Meters constructed in imitation of his, but unskilfully made on erroneous principles, and with improper and unsuitable materials.

THOMAS GLOVER'S Workshops are now the most extensive in this or any other Country, and he is thereby enabled promptly to execute orders to any extent required. Purchasers may at any time inspect his Works and the Materials of which his Meters are constructed. He is ready to enter into Contracts with Gas Companies and others to uphold their Stock of his Meters for Twenty Years at an annual charge varying from 2½ to 5 per cent., and to leave always in the hands of Gas Companies Three Years' charge for upholding, as a guarantee for the fulfilment of the Contract.

CROSLEY & GOLDSMITH'S

PATENT SELF-ADJUSTING & COMPENSATING GAS-METERS

CANNOT BE OVER OR UNDERCHARGED WITH WATER,

and they consequently register the quantity of Gas consumed with greater accuracy than Meters in which the Water-Line is variable.

MANUFACTURED BY

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

103, SOUTHWARK BRIDGE ROAD, LONDON.

N.B. The Patent Self-Adjusting and Compensating Apparatus may be applied to the ordinary Meter.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENT METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

C. and Co. are the only house in the trade which has for years manufactured Meters according to the standard measure set forth in the 2nd Section of the "Sale of Gas Act," and which also comply with the rules laid down in the Section for testing meters. Purchasers of C. and Co.'s Meters may therefore be secured against any additional expenses being incurred in order to adapt their Meters to the requirements of the new Act.

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TO CORRESPONDENTS.

Gens.—*The present quoted market price of the London Gas Company's original shares is £50, sellers.*

NOTICES.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 30, 1859.

NOTES UPON PASSING EVENTS.

IN our last number we alluded to the indecent exhibition of the aristocratic tendencies of some of the so-called Liberals of the pure Whig school; but during the last fortnight they have furnished even a more striking illustration of their real principles in the nomination of Mr. Cowper to the post of President of the Board of Trade. Now, with all respect for the personal worth of the amiable son-in-law of the Premier, it does seem to us strange that, at the present day, mere family interest should still be allowed to influence the selection of the persons charged with a species of superintendence over the commercial relations of such a country as Great Britain; that the nomination of Mr. Cowper to such a post is especially obnoxious to the reproach of Whig jobbery. In his former tenure of office, as virtual President of the Council of Education, that gentleman simply proved that he himself needed a share of the blessings his branch of the Administration was supposed to diffuse; for he could not indite a circular or a letter, without committing a most ridiculous series of grammatical blunders. However, the relatives of Whig Lords have a species of heaven-born aptitude for office and salary; so Mr. Cowper, having proved himself to be deficient in knowledge of the English language, was at once discovered to be able to direct a class of operations still more uncongenial with his former occupations and studies even than those connected with education had been. Truly it must require very little wisdom to govern the world! and Whiggery must be a grand invention for the junior scions of the upper ten thousand! But how are we to account for the silence of the *Times* on the subject of this job?

In the meantime, and whilst the interests of the commerce of Great Britain are being thus bartered by the Whigs for family purposes, and by the Tories for the security of their party influence (if at least we may believe the report of the Committee on the Packet Contracts), the true commercial classes of the country seem to be exerting themselves energetically to obviate the effects of the misgovernment which seem to be inherent in our administration, by whatsoever party it may be conducted. Perhaps the most striking illustration of the indomitable perseverance of English capitalists is the one lately given by the projectors of the *Great Eastern* steam-ship; and it is humiliating to find that the success of this marvellous experiment should be imperilled by the utter incapacity of our rulers. Not only has nothing been done to assist the builders of this gigantic vessel in solving the various problems connected with its construction, but indirectly every commercial difficulty has been thrown in their way, by subsidizing their opponents. The *Great Eastern* Steam-Ship Company have, nevertheless, persevered, and their floating city is at length nearly ready for trial—fortunately, unencumbered with Government patronage, and free from Government interference. Most earnestly do we wish them success, for, indeed, every advance in the art of Navigation, every improvement in the modes of internal communication, is fraught with interest to society in general; and therefore the results of this experiment will be watched attentively by all who look a little below the mere surface of things.

We commend to the special attention of our readers a fact which has lately taken place at Lincoln; because we think that it illustrates the tendencies of the existing Government of England somewhat in the same manner as the nomination of Mr. Cowper to the Board of Trade, or the interference of Sir G. C. Lewis with the St. George's Vestry. The story to which we thus allude is the one connected with the nomination of a certain Mr. Vernon to the Recordership of Lincoln, without any communication with the Local authorities. Very justly the inhabitants of the town are indignant at this stretch of power by the Central Government; but it is hard now to find a remedy for the evil; inasmuch as by fair means, or by foul, that necessary misfortune, has extended its influence to so fatal an extent that Englishmen seem disposed even to lug their chains, or at any rate to be unable to appreciate the consequences of the system so rapidly, but so surely, undermining our liberties. What has lately taken place at Lincoln will, in all probability, soon take place elsewhere, and it would by no means surprise us to hear that the present Home Secretary contemplated the introduction of a measure vesting the appointment of the Mayors and Recorders distinctly in the Crown. Such a system actually prevails in countries ruled upon the principles of true Bentham and Rousseau socialism; and, from the conduct of some of the advanced members of that school when in office here, it may be suspected that they will labour, in season and out of season, to introduce it in England. At any rate, it is now, more than ever, desirable that the influence of the Crown in the nomination of members of the Bench should be regarded with jealousy; for, subsequently to the recent blundering attempts made by our legistors to copy the worst parts of the forms of procedure of the Code Napoléon, our Judges have manifested a tendency to consider themselves as to some extent advocates for the prosecution in criminal cases. Now as ever, the independence of our Judges is a matter of national importance; and therefore the intervention of the Central Government in their selection should be resisted as much as possible.

There have been latterly some rather serious colliery explosions, and some accidents on ship-board, which require a short notice in this JOURNAL. The first of these accidents, however, to which we allude—viz., that of the explosion of fire-damp in the Tredegar Colliery—was not marked by any circumstances of an extraordinary nature, beyond the indications it gave of the fiery nature of the coal-field in which it occurred; but the explosion which took place on board the *Lebanon*, under the coal-drops of Monkwearmouth, confirms the opinion usually entertained as to the dangerous nature of coal cargoes, and therefore of the necessity of insuring them. It is to be suspected that the loss of many of the ships, sailing either from the English northern, or from the South Wales, ports, may be accounted for by the occurrence of similar explosions; and

that many a vessel has gone down at sea, without leaving any trace of its sad tale, in consequence of the accidental communication of fire to the gases given out by a coal cargo whilst the hatches were battened down during a storm. Sailors should be taught, a little more than they now are, the natural laws affecting the goods entrusted to their care; and certainly gas manufacturers would do wisely to study the laws which regulate the evolution of the vapours from the raw article of their business. The policy of storing large quantities of coal must be materially influenced by the possibility of this said evolution of vapour upon the illuminating quality of the gas.

Coal mines seem latterly to have suffered from sources of danger extraneous to themselves, if such a phrase may be used; for we have had occasion already to notice the legal proceedings connected with the movements produced by this class of operations upon neighbouring property, and more recently still we notice that in consequence of some such action, the Walsall Canal has burst. Fortunately the pit itself, which produced the accident, served to absorb the water thus let loose, so that no serious flooding of the country occurred—like that which took place some time since when Messrs. Baxter's Reservoir, at Dundee, met with a similar fate. But the comparative frequence of these accidents would seem to call for a more stringent supervision by the local authorities over works which are thus shown to be attended with danger to the community. How is this supervision to be reconciled with the exercise of individual liberty? Do what we will these theoretical questions force themselves upon us; for so complicated do the relations of civilized life become that it seems to be inevitable that we must sacrifice some important portion of our own, in order to allow others to exercise their rights. For instance, the proprietors of the Tovil Mill, near Maidstone, are said to contaminate the stream of their valley by casting the refuse from their straw paper works into that natural drainage course of the district. It may be hard upon them to deprive them of their easement upon this drainage; but evidently they have no right to contaminate a stream used by their neighbours for the ordinary purposes of life. The proprietors of the coal mine under the Walsall Canal will no doubt be made to suffer heavily in purse for the mischief to which they have given rise; and the proprietors of the Tovil Mill will also no doubt be made to feel that the law can reach them; but it seems to us that it would not be impossible to devise some remedy which should act, as it were "a parte ante," rather than "a parte post;" and that it would be possible to prevent, rather than to punish, such infractions of the law.

Coal mines just now seem, both at home and abroad, to be exposed to a very serious inconvenience in the matter of strikes, for we read of movements of that description in the neighbourhood of Birmingham, and also in the neighbourhood of Charleroi. How strangely do these questions of the organization of labour force themselves upon public attention, and how difficult is their solution! The great London strike itself still continues to injure the building tradesmen, and, unfortunately, both parties seem to be as unwilling to yield as ever. This is a tolerably clear indication, we think, that both parties are to some extent in the wrong; but who can persuade either of them to listen to reason when their passions have been so bitterly excited?

Whilst the name of Charleroi is under our pen, we cannot refrain from relating a little tale which illustrates so forcibly the consequences of red-tapeism in a centralized administration, that it may be especially recommended to the notice of Mr. Chadwick and his friends. The tale is as follows:—A fire broke out in a village situated near Charleroi, and some workmen of the town immediately ran to the fire-engine shed, took out the engine, and dragged it to the gates of the town. Here, however, they were stopped, for the gates were shut for the night, and the keeper refused to open them without the payment of the town dues, which the working volunteers were not able to advance. Fortunately, after some waste of valuable time, and much squabbling, M. Spitaels, a member of the Belgian Senate, came to the gates and paid the toll, so that the engine was able still to render some service; yet what a commentary does the whole story furnish upon the effects of the system which could have warranted so ridiculous an exercise of the letter of the law! It is true that the Echevin and the municipality have, subsequently to the occurrence of this incident, issued some fresh regulations; but the evil in these cases lies quite as much with the men who are employed to carry out the respective systems, as it does with the systems themselves, bad though they be.

In England we have not yet been made to feel in any serious manner the consequences of the recent disturbances of the atmospheric conditions; but on the Continent there have recently occurred many startling incidents which should induce us to take our precautions in time. Not only has the extraordinary drought of the last summer given rise to some dreadful conflagrations in the forests of Germany and Russia, as well as to some important interferences with the wood trade of Sweden and Norway; but it would appear from recent journals that the state of public health in Western Europe is becoming of a dangerous character. The ordinary autumnal epidemics of Friesland and Gröningen have already begun to exercise their ravages in a very exceptional degree; and, what is far more serious, the Asiatic cholera seems to be reviving. It has exhibited itself in a serious form at Elberfeld, and in the provinces on the east of the Rhine; whilst in Spain it has raged with terrific violence. In Murcia this fell disease has prevailed for a long time, and though the papers state that Madrid had been spared, it is worthy of remark that the Gazette of the 19th instant contains decrees for dismissing such of the Government *employés* as deserted their posts during the alarm produced by the scourge. We have had our warnings too in England; but alas! we seem as little disposed as ever, seriously to address ourselves to one simple class of precautions, and we are about as indifferent as we ever were wont to be in our devotions to the shrines of Coleridge's "nymphs who reign o'er sewers and stinks." *Absit omen:* may we be spared the periodical visit of the modern plague, which seems as capricious and unaccountable in its course as its predecessors; but surely we should do well to set our house in as good order as we can whilst it is yet time, and to urge as rapidly as possible the execution of the great organic works we have lately undertaken. One of the first things we have to do is to provide a remedy for the past errors of the General Board of Health, and to rescue the natural watercourses of the country from the systematic contamination to which they have been recently exposed. If Mr. Fitzroy would inquire into this subject, he might do infinite good to his country; and gain for himself a better title to fame than any of his predecessors can boast of.

Our Transatlantic brethren, "if they have writ their annals true," are entering vigorously upon the course of nuisance crusades, in New York at least; for we read in the journals of that town that the Superintending Sanitary Inspector, accompanied by no less than 87 constables, proceeded in July last to destroy a number of pigsties, and to close a number of low slaughter-houses, offal-boilers' shops, &c. So that, now-a-days, in the free and enlightened States of North America, not only is it unlawful for a man "to wallop his own nigger," but he must not even keep, or kill, a pig where he likes. Thus it ever is: the Social Contract about which so much nonsense has been talked, and written, only means that in densely-peopled communities we must, as we said before, give up some of our abstract rights, in order not to interfere with the rights of others. There appears also to have recently occurred another incident at New York of a nature to prove that, after all, things there will soon settle down to our type; for Justice Sutherland of the Bench of that State has decided in favour of a demurrer, on the part of the Metropolitan Gaslight Company, to a writ of "*quo warranto*" issued by the Attorney-General; and thus the Bench has established the right of the said new Company to construct Gas-Works, in defiance of the supposed monopoly of the old Company. Perhaps the arguments in this case might interest our readers, and we will endeavour to procure them; but, in the meantime, is it not curious thus to find our Cousins running through the same phases of Gas Competition which we have gone through before, at so heavy a cost?

By the way, these cases of repetition of some of the incidents of our hygienic and municipal experience are not confined to America, for just at the present moment Brussels, the city held up of yore by Mr. F. O. Ward and his friends as a model for our imitation, is just now in a sad state of excitement, on account of the awful condition of the little river Senne, which constitutes, in fact, the main sewer of the town. If such a thing were possible, we should almost be disposed to say that the Senne is more repulsive even than the Thames, and that its odour is even worse than that of some of the streets and canals of Cologne and Amsterdam; nor can we be

surprised that, with the Cholera rapidly approaching them, the inhabitants of Brussels should be anxious to remove such a source of danger. Yet even here the great question arises, "What are we to do with it"—that said sewerage—when it is once collected in covered channels and removed from the heart of the town? With the indomitable perseverance and the undoubted agricultural skill of the Flemings, it is possible that *they* may discover an answer to the problem which has hitherto defied *our* researches; and therefore the operations of the Belgian authorities will be watched with interest.

And so likewise will the efforts of the French Government, to extend the practice of irrigation in its Algerian colony, constitute an object of deep interest to all the civilized world. That district is indeed one which would be the most signally benefited by the introduction of a systematic irrigation; and the new Colonial administration has very wisely come to the conclusion that the first measure it should adopt for the purpose, would consist in the introduction of a complete body of jurisprudence on the subject of the water privileges connected with this branch of Hydraulic Agriculture. Within a very short time, then, it is expected that the French system of laws upon the subject of irrigation will be applied in Algeria; and perhaps our own Indian or other colonial legislators may be induced to follow the example. Sooner or later perhaps the rulers of the world may find out that such peaceful occupations as these are as well worthy of their notice as the costly and useless triumphs of war; but though wisdom may cry in the streets, it is sadly to be feared that she has few followers. Be this as it may, the French Government must be considered to have addressed itself seriously of late to its pacific duties, for on all sides it has undertaken works of public utility. Some of these we should do well to watch, and even to imitate; and amongst the former category it would, perhaps, be advisable to class the works for the improvement of the Channel ports. At Boulogne, for instance, a very heavy outlay is about to be undertaken for the improvement of that troublesome and expensive harbour immediately opposite to our own little "portling" of Folkestone.

MR. FLINTOFF'S MISSION TO GLASGOW.

A MAN with a mission is most frequently a great bore and a public nuisance, and there is no exception to the rule in the case of Mr. Flintoff, who fancies he has a mission to reform the gas supply of the whole kingdom. We have on several occasions had to notice the proceedings of that gentleman in the fulfilment of his assumed mission at Sheffield, in Dublin, and elsewhere, and we have now to record the efforts he has recently been making at Glasgow to dissatisfy the gas consumers of that city, and to induce them to form a consumers' company, whereby the price of gas might be cheapened, and the interests of George Flintoff, Esq., might be promoted. Why he should make his appearance at Glasgow at this time is not very apparent; but it forms no part of Mr. Flintoff's tactics to wait till he is called for; and wherever he perceives a chance of carrying out his mission successfully to himself, there he is found, and there he endeavours to introduce his "reforms." Having ascertained that the people of Glasgow were paying 5s. per 1000 feet for gas, whilst in the City of London, remote from beds of coal, gas is supplied for 4s. the 1000 feet, this contrast of circumstances in the gas supply of the two cities was *primâ facie* evidence to Mr. Flintoff that something might be made of it; and without waiting to consider the difference in the quality, or whether the four-shilling gas afforded remunerative dividends, off he started for Glasgow, to rouse the inhabitants to a due sense of the grievance they are suffering, and to induce them to give him a job. He opened his budget in the Trades' Hall of that city on the 8th instant, when he enlightened his audience on the subject of gas-making; told them that gas companies generally are now enjoying a monopoly of the supply of one of the necessaries of life; that the price of gas in all large towns ought to be nearly the same, excepting in places like Glasgow, where the facilities for obtaining coal are so great; and that, nevertheless, though so favourably situated, they were charged 5s. for the same quantity of gas that is supplied for 4s. in the City of London, where the coal was brought all the way from Newcastle. Why should the usually cannie folk of Glasgow thus submit to be imposed on by the monopolizing companies, when by forming an independent company, with George Flintoff, Esq., as its manager, they might be supplied with gas for 3s. 6d. the 1000 feet, and realize a dividend of 10 per cent. on their shares? Why should they throw away £12,000 per annum to monopolists, who know so little how to conduct the business of gas-making as to overlook the good cannel coal close to their works, which might be had almost for nothing, and send for their costly supply to a distance? The whole of that £12,000 might be saved, and the 10 per cent. on capital might be pocketed by accepting his mission, thus adding one more to the seventeen towns already benefited by his labours. Surely the good folk of Glasgow must be daft instead of cannie not to have at once embraced Mr. Flintoff, and accepted his mission off-hand. It may be that the caution which is characteristic of our friends in the north blunted their faculties to the appreciation of the value of those offers to their advantage, for they exhibited but little eagerness to accept them. They could not readily believe that their fellow-citizens, the managers of the existing gas companies, would be so stupid as to bring coal from Lesmahago at a cost of 25s. a ton, when it might be had so much cheaper close at hand, unless there were compensating advantages in the superiority of its quality at least equal to the difference in price; and if the coal in Glasgow costs 25s. per ton, the favourable position of that city for gas-making in comparison with London disappeared. Many of those whom Mr. Flintoff addressed might also have been aware that the gas supplied in Glasgow has nearly double the illuminating power of the London gas, and it would require no profound knowledge of arithmetic to calculate that if the people of Glasgow have double the amount of light for 5s. which the citizens of London obtain for 4s., they would gain a loss by adopting the London standard of price and quality. It is probable, too, that some of his auditors might have known that the supply of 4s. gas is confined within the densely populated limits of the City of London, where it has never yielded a remunerative profit, and that the price in the metropolis generally is 4s. 6d. for 12-candle gas, whilst the gas supplied by the Glasgow companies has an illuminating power of from 20 to 25 candles.

The exuberance of Mr. Flintoff's zeal in the furtherance of his mission leads him to make statements the reverse of truth, and induces him also to conceal the results of his experience in other towns where his labours were exerted in the same cause. To compare the nominal price of gas in Glasgow with that in the City of London, without at the same time taking into consideration the difference of illuminating power, is a misrepresentation amounting to falsehood; and to select for comparison the exceptional case of the City of London, which is so dissimilar to that of Glasgow, when there are other parts of the metropolis wherein the conditions of gas supply nearly resemble it, shows, to say the least, an extraordinary want of discrimination, that might be construed into an intention to deceive.

Mr. Flintoff could scarcely have been ignorant that there are some districts of the metropolis supplied with cannel gas, for which, though of inferior quality to that of Glasgow, the consumers are charged 6s. per 1000 feet, besides meter-rents. In Glasgow, the charge is 5s., with a discount of from 5 to 15 per cent. according to the quantity consumed, which reduces the average price to 4s. 6d.; and the Glasgow companies furthermore introduce service-pipes into the buildings, and attach meters without any charge whatever. It is between these two conditions of the gas supply of the metropolis of the west of Scotland and the metropolis of England that comparison should be rightly instituted, and, though the agitators for gas reform in London, which is Mr. Flintoff's model city, have at length admitted that they have reason to be satisfied with the existing supply of gas, the citizens of Glasgow, it seems, have cause to to congratulate themselves on being still better served. Whether Mr. Flintoff would serve them so well there is very good reason to doubt. He admits that 10 per cent. is a reasonable return to the shareholders for capital invested in such undertakings, yet none of the London gas companies share dividends to that amount; and it should be borne in mind that the metropolitan companies enjoy the advantage of a much larger demand than the gas companies of Glasgow, the gross annual revenue of one of them being only £49,000 from 26,000 meters, whilst the rental of some of the London companies is four times that amount in more densely populated districts.

Those who are acquainted with Mr. Flintoff's career cannot fail to notice that the advantages he offers from the adoption of his reforms have gradually diminished with his increasing experience. When, in 1853, he called on the gas consumers of Blackburn to emancipate themselves from the thraldom of the monopolists, he offered them cannel gas at 2s. 7½d. per 1000 feet, and he promised the shareholders a dividend of

10 per cent. But they were obdurate to the force of his arguments, and refused the tempting offer. In Sheffield, in the same year, he was more successful, and, though his price was raised to 3s. per 1000 feet, the more gullable inhabitants of that town were induced to form a company, wherein they embarked £50,000 in the hope of obtaining 10 per cent. for their capital. More recently, Mr. Flintoff was in Dublin, where an advance to 3s. 3½d. was necessary to produce his standard dividend of 10 per cent.; and now we find him in Glasgow, in the heart of the coal district, with a further advance to 3s. 6d. Increased experience may probably teach him that the price of 5s. per 1000 feet for cannel gas is requisite to gain the profit he promises.

How far Mr. Flintoff is likely to realize the hopes he endeavours to raise, may be gathered from his performances at Sheffield, the results of which he carefully conceals. The Sheffield Consumers' Company started under his management with the pleasing anticipation of pocketing 10 per cent. by supplying their fellow-townsmen with gas at 3s. the 1000 feet; but in one year from the commencement of operations they were compelled, in consequence of the losses sustained, to raise the price to 4s. It was still in vain that they looked for the promised 10 per cent., and when at length, disappointed and desponding, they transferred their works to the old company, it was found from dear-bought experience that the sale of 14,500,000 feet of gas at 3s. and of 18,500,000 at 4s. had resulted in a loss of nearly 11½d. per 1000 feet of gas sold, exclusive of the interest on capital invested; and that, so far from the shareholders receiving their 10 per cent., there was a balance of loss against them amounting to upwards of £1500. Mr. Flintoff must surely imagine the good citizens of Glasgow to be "unco' daft" if, with the warning of Sheffield before them, he expects they will snatch at his hook, baited with 3s. 6d. gas and 10 per cent. profits. The fish to be caught across the border are not *gudgeons*, and we recommend him to exercise his mission as gas reformer in places not so far north.

ON THE STATE OF THE SERPENTINE.

Since the publication of our last number the contest with respect to Mr. Hawksley's project for purifying partially the waters of the Serpentine has been carried on with a singular amount of personal bitterness, on the part of some of the more prominent advocates of the respective schemes for effecting the desired object. In consequence of the personal character thus given to the discussion, the mere abstract rights of the subject have, we think, been overlooked to some extent; and it may therefore be desirable to recall public attention to the real practical questions involved.

We cannot, however, refrain from recording, "*in limine*," our very strong protest against the system, which seems to be so strangely in favour in the higher departments of the Administration, whereby Contractors for works are allowed to pronounce upon the merits of the very schemes they themselves have suggested. Messrs. Easton and Amos have especially been guilty of the bad taste and professional impropriety thus alluded to; and for that very reason the whole of the evidence brought forward in this matter of cleansing the Serpentine, by themselves and by their friends, is at once vitiated. They have avowedly a distinct pecuniary interest in supporting the particular scheme they have undertaken to execute; and, this being the case, their opinions upon the general question must be received with extreme caution. In fact, the only reason for their not being at once dismissed with the contempt they have deserved, is that the *Times*, and a certain noisy set of professional agitators, have availed themselves of Messrs. Easton and Amos's names to attack the designs of one who, at least, is free from any accusation of interested motives. If we are, however, obliged occasionally to use in the sequel proper names, and to give a somewhat personal character to our remarks, the gentlemen thus alluded to have only themselves to blame: we know nothing of them personally, and we assure them, and the public, that it is with bitter regret that we find ourselves compelled to attack them, in the manner we find it necessary now to do, in consequence of the position they have assumed, and of some of their own and of their friends' assertions.

As to the Serpentine itself, not having the fear of the great quondam "ruler over sewers and stinks" (who, by the way, can boast little of the "nymph"), Mr. E. Chadwick, before our eyes, we declare again that the denunciations as to its bad state are gross exaggerations, and that the description given of the present condition of its waters by Mr. Hawksley contained the whole truth of this part of the subject. There is very rarely any smell observable in the upper portion of the Serpentine, and the only substantial objections to the continuance of the existing state of the river are to be found in the rapid development of the lower forms of vegetable life (which takes place especially in the shallow, stagnant, waters in Kensington Gardens) and in the occasional overflows from the old Bayswater Brook sewer. The remedies to these evils are, we think, very simple, and substantially Mr. Hawksley has directed his attention to them in a very business-like manner, though, perhaps, other solutions of the question might be found. All that is necessary is to maintain a constant state of motion in the water, so as to remove the germs of the vegetation abovementioned; and this may be effected either by causing the water to circulate in the manner proposed by Mr. Hawksley, or by the introduction of a permanent supply of fresh water from some extraneous source. As to filling up the holes, and to removing the mud from the present bed of the Serpentine, it would simply be absurd to attempt to do anything of the kind; for the quantity of mud to be removed (150,000 cubic yards) is so enormous (and of course the quantity to be brought in to replace it and to fill up the holes must be still more so), that the expense of such an operation must render its execution utterly impossible. Besides this consideration of the amount of cost, there is the graver one of the necessity for undertaking it at all; and when such a man as Mr. Spencer assures the public that the mud of the Serpentine is, in any practical sense, innocuous, the consideration of that part of the question may safely be dismissed. The whole question of the purification of the waters of the Serpentine, then, turns finally on the choice of the means to be adopted to give the necessary motion to them.

There are three methods, of a more or less practical character, by means of which the flow of the Serpentine might be rendered sufficient for the desired purpose:—1. The introduction of a fresh supply to be obtained from a well to be sunk into one of the water-bearing strata of the neighbourhood, and thence pumped into the Serpentine in the manner suggested, in fact, by Messrs. Easton and Amos. 2. The introduction of a quantity of water from the mains of one or other of the London Water-Works Companies; and, 3, the maintenance of a species of circulation in the waters of the Serpentine itself, causing them to undergo a process of purification in their course, in the manner proposed by Mr. Hawksley.

Now, as the area of permeable gravel overlying the London clay near the Serpentine is very limited, and in fact is barely able to supply water enough to compensate for the evaporation from the surface of that pond, the only source Messrs. Easton and Amos could resort to is the one they have suggested—viz., the sand bed communicating with the tidal portion of the Thames, and which they themselves have already resorted to in the case of the supply of the ornamental waters of St. James's Park. It would no doubt be possible to obtain from the present, or from a new, well in Duck Island the quantity now required, but there must be a very great danger to the houses in Westminster in establishing any serious change in the conditions of the very treacherous foundations upon which they are built. The experience of the Victoria sewer ought indeed to teach our non-professional Engineers that the establishment of anything like a serious alteration in the direction of the flow of the underground waters of this district will be attended with serious consequences; and even professional Engineers who are *not* eminent, and therefore are consulted by Mr. Chadwick in preference to the more distinguished members of the profession, would hesitate before they attempted to supply both the Serpentine and the St. James's Park from wells fed by the infiltrations from a running sand like that of Westminster. But even if this be left out of consideration, there remains the question which must decide the choice of all such schemes—viz., the question of cost; and it does seem to us that however copious the supply at Duck Island may be, it will be impossible by any combination of pumping machinery *on a small scale* to raise and deliver into the Serpentine a sufficient quantity of water at a rate of less than from 3d. to 6d. per 1000 gallons. The dead lift must be at least 60 feet, and the length of main at least 1¼ to 1½ miles; it is true that no way-leave need be obtained, and that no land need be purchased; but on the other hand it is to be observed that the whole expense of the establishment, and of its working staff, must be borne by the Serpentine alone, and we think that consequently the cost of raising the

water must be at least as great as the cost of similar operations to the great London Companies. Messrs. Easton and Amos have erred greatly—in their own interest even—in not alluding to the detailed working cost of the water they proposed to supply, and the weak point of their case lies precisely in the singular manner in which they have omitted to notice the permanent charges on the scheme which they offer to execute for a definite sum, in their equivocal position of Engineers and Contractors.

At any rate, there seem to us to be few reasons for supposing that Messrs. Easton and Amos would be able to deliver water from a well in Duck Island, to the head of the Serpentine, at a cheaper rate than either the Grand Junction or the West Middlesex Companies could do. The trunk mains of both those Companies, in fact, run along the Bayswater Road; and we think that either of them would supply water at the rate of about 4d. per 1000 gallons, if taken in very large quantities. But what are those quantities to be? Are they such as to justify the resort to a scheme such as has been proposed by Mr. Hawksley?

It seems to us that, allowing for the interest on the original outlay for the depreciation and for the working expenses, that the cost of Mr. Hawksley's scheme will be at least £1800 per annum. For this sum, which may be considered to be equivalent to £5 per day, a quantity of fresh filtered water could be obtained from the water companies equal to 300,000 gallons per day throughout the year. Is this enough? for if it be, then evidently it cannot be desirable to sink the money of the nation in plant and machinery, whether at Duck Island or at the head of the Serpentine. Of course it must be borne in mind, in reasoning on the matter, that during the winter months no fresh water need be introduced, and that as a necessary consequence the daily summer supply might be increased.

Mr. Hawksley considers—and there is no man living who has had such opportunities of studying these technical and scientific questions as he has enjoyed, or who brings to bear on such studies so vast a range of information—that the whole of the water of the Serpentine ought to be renewed in the course of a month during the hot weather, This would be equivalent to the introduction of not less than 2,000,000 gallons of fresh water per day, and thus at once the whole question of cost settles the discussion; for we believe that, whether the fresh water come from Duck Island or from Hampton, it would be utterly impossible to give anything like that quantity of water for less than three times the working expenses of Mr. Hawksley's scheme, as estimated by ourselves. All turns, in fact, upon the quantity of water to be supplied; and there can be no appeal from the decision of Mr. Hawksley on this subject, unless some person of equal experience with himself should be able to maintain that a smaller quantity than 2,000,000 gallons a day would be sufficient for the purpose. Most distinctly do we refuse to attach any serious importance to the opinions of Sir J. Paxton, Mr. E. Chadwick, or the omniscient Barristers-at-Law who write for the *Times* under the inspiration of Mr. Lilwall, on a subject of so very special a nature; and although we ourselves think that a supply such as might be obtained from the Metropolitan Companies for an annual payment of £1800 would be sufficient, we have so unbounded a confidence in Mr. Hawksley's superior knowledge of the subject as at once to abandon our own opinion. Certain it is that the scheme he proposes would deal more rapidly and more thoroughly with the water of the Serpentine than the smaller and more limited one we suggest would do; and therefore the former would be preferable, all other things being equal.

As to the disfigurement of the Gardens by the erection of the Filter-beds, or to the nuisance from working the same, all we can say is that they who raised this cry either knew nothing about the subject they pretended to discuss, or that they have wilfully uttered nonsense about it. It is, as Mr. Hawksley very properly said, easy to make Filter-beds, such as he proposes, positively elegant and consistent ornaments of a formal artificial garden; and the removal of the dirty sand may easily be effected in such a manner as to be almost unperceived, even by the dwellers in the row of houses immediately opposite the site of the intended works. The Engine-house everybody knows that it would be easy to conceal; and as to the smoke nuisance, the only chance of its being felt arises from the fact that the Engine would have to be worked for the account of the Government. There is no real objection to the system proposed by Mr. Hawksley, and after a careful investigation of the various methods suggested for accomplishing the desired object, we are convinced that it is the cheapest as well as the most effectual of them all.

The observations of Sir M. Peto, and of Messrs. Easton and Amos, on the retentive nature of the concrete in the St. James's Park basin open up so curious and so interesting a subject for discussion that we must reserve it for some other occasion. For the present it may suffice for us to say that we are convinced that Sir M. Peto is, in the main, perfectly correct in saying that the said concrete is not such as it is asserted to be. Any person who witnessed the careless and unscientific manner in which that concrete was made, must have been convinced that it was utterly impossible for the bed of this basin to be impervious.

Circular to Gas Companies.

The typographical errors in the copy of the "Act for regulating measures used in sales of gas" alluded to in our last number, have been corrected in the official copies of the Act since published, as well as a further error in the eighth line of the 13th Section which escaped our previous notice, wherein the insertion of the word "for" instead of "nor" rendered the sentence unintelligible. As corrected, this section requires all meters to be tested for soundness or leakage under a pressure equal to a column of water three inches high, at a speed *not exceeding* one-twentieth part of the measuring capacity per hour, nor less than half a cubic foot per hour, for meters having a measuring capacity of 100 cubic feet per hour or less; and at a speed not exceeding one-fortieth part of the measuring capacity per hour for meters the measuring capacity of which exceeds 100 cubic feet per hour. We confess we do not see the *rationale* of subjecting a 100 feet (20 light) meter to the double test of half a foot and five feet per hour, while a 150 feet (30 light) is only subject to a single test of 3·75 feet per hour; nor can we comprehend the distinction attempted to be drawn in the two paragraphs of this section between the test "for soundness or leakage" and the test "for per centage of error," unless the former is simply intended to test the soundness of the workmanship in the valves and diaphragms of dry meters and the measuring drums of wet meters, and generally of the outer cases of both descriptions of meters. But even for this purpose such a test is imperfect, as the difference in pressure between the inlet and outlet apertures of the valves and the surfaces of the diaphragms and measuring-drums of the meters, will not exceed the friction of the meter, and this will be so insignificant at the slow speeds at which this test is to be applied, as to render any loss through the valves and diaphragms inappreciable unless the experiment is continued for several hours, or there be some palpable defect in the measuring machinery.

In the marginal abstract of the 13th Section the word "buyer" has been inadvertently inserted for "seller" in the first part, and *vice versâ* "seller" for "buyer" in the latter part, but as the body of the Section is correctly printed the error is not material.

A vague apprehension seems to be entertained in some quarters that the passing of this Act will subject gas companies to serious annoyance from professional informers, an apprehension in which we do not participate if ordinary care and diligence be exercised in complying with the provisions of the Act, inasmuch as all matters fixed before August 13, 1860, are exempt from its operation till the same date in 1869, unless the purchaser or seller of the gas shall either of them require the meter to be tested and stamped if found to be correct; but as the expenses of this proceeding are to be paid by the party requiring it to be done, there is ample protection against this power being abused. So again, should a consumer of gas require a stamped meter to be substituted for an unstamped one fixed before the 13th of August next, the change must be made at the consumer's expense for ten years to come. It is only after the expiration of that period that the meters fixed previous to that date become liable to the penalties mentioned in the Act if they are then in use and unstamped. For their own sakes gas companies will of course take care that the meters fixed by them during the next twelve months are so constructed as to comply with the conditions of the 12th and 13th Sections of the Act, and are such as will pass the inspectors' examination at some future period. The alteration

in the standard of measure from 62·5lbs. of distilled water, the standard of the cubic foot originally adopted by Mr. Samuel Crosley, to 62·321 lbs., will not occasion any considerable inconvenience, as the difference amounts only to ·287 per cent., while the tolerated variation is 2 per cent. against the buyer and 3 per cent. against the seller of the gas. The condition, however, that no meter shall be stamped which shall be found capable of registering in excess of these tolerated variations "by any contrivance for that purpose, or by increase or decrease of water in the meter, or by any other means practically prevented in good meters," must effect a complete revolution in the meter trade, as a large proportion of those now in use can be overcharged with water beyond the tolerated limit of variation. A meter with a side-plug for regulating the water-level will for the future be looked upon with suspicion, as it raises the presumption that the spout is not cut down to the true water-level, and that the meter may be overcharged. It would in our opinion be far better for manufacturers to abandon the side regulation altogether as useless, and regulate solely by the spout, in the manner practised for some time past by several of the most intelligent makers, who are now able to announce that in this respect their meters have long complied with the requirements of the new law.

Mr. Copcutt, whose several inventions in connexion with the so-called "Life Light" have been previously noticed in our columns, has added one more to the list of patents taken out in his name, the specification of which will be found in another column. This, we presume, is one of the patents proposed to be assigned in consideration of £30,000 in hard cash, and £30,000 in paid-up shares of "The Universal Light and Portable Gas Company (Limited)," according to a prospectus privately circulated some few weeks since, and noticed in the *Times* City article in November last. The subject of compressing rich cannel coal gas into portable vessels is attracting considerable attention on the continent, and our readers will find in another column of our present issue the translation of a report addressed to the engineer-in-chief of the Paris and Strasburg railway, and published in February last, wherein it is stated that Boghead cannel gas at a cost of 70 centimes the cubic mètre (15s. 8d. per 100 cubic feet), charged in vessels under a pressure of eleven atmospheres, presented an economy of 50 per cent. over rape oil at 4s. per gallon, in lighting the fixed lights of that line of railway. The difficulties attending the reduction of pressure from eleven atmospheres to that required for the economical combustion of the gas are, we understand, completely overcome in the French apparatus by an ingeniously contrived regulator; and if Boghead cannel gas will permanently sustain this enormous pressure without deterioration of its illuminating power, an increased field is opened for the use of that extraordinary material which will tend still further to enhance its present high price. Our readers must not confound the system described in this report with any of Mr. Copcutt's processes, one of which contemplates the use of the Drummond or oxy-hydrogen and lime light, and the other highly carburetted gas enriched by camphor or camphorated ether.

Correspondence.

THE SOUTH OF LONDON METER INSPECTOR.

SIR,—In reference to the remarks made in the JOURNAL of the 16th inst. as to my appointment not being in virtue of any statutory powers, I beg to state, by referring to the 54th clause of the 17th and 18th Vic., cap. 94, you will find that the trustees for the time being of the consumers have power to appoint a chemical referee to test the quality of the gas, and *an inspector to examine the accuracy of the meters* supplied by the Surrey Consumers' Company, and that my appointment as such inspector was announced by the trustees in a circular issued by them on May 10, 1854.

G. MILLS.

South of London Meter Inspector's Office,
Borough Road, Aug. 25, 1859.

Register of New Patents.

413.—JAMES COPCUTT, of 26, Kirby Street, Hatton Garden, London, for "*Improvements in obtaining light from gases.*" Patent dated Feb. 14, 1859.

This invention has for its object improvements in obtaining light from gas. In obtaining what is called oxy-hydrogen light by directing a jet of ignited gas on to lime or a prepared material, the patentee has found that a better effect is obtained by employing the gases at a far greater pressure than the apparatus now employed will admit of. In producing the light he therefore employs a far greater pressure than heretofore; and to contain the gases he uses two vessels such as have been before employed for storing gas for illumination, and capable of sustaining great pressure. Into these vessels the gas is caused to be forced by pumps or otherwise—the oxygen into one vessel, and the hydrogen into another, and both by preference at a pressure of several atmospheres. Each of such vessels is connected to the same tube leading to the burner, which it is preferred should be only very slightly inclined towards the lime or other material used. And in order to regulate the supply from the two vessels to the jet or burner a cock is employed to each vessel, consisting of a screw-plug entering a suitable chamber. The under surface of the plug is concave, so that when screwed down on the bottom of the chamber (into which the passage from the gas vessel enters), the flow of gas from the vessel may be stopped. The passage which leads to the jet-pipe or burner enters the chamber at right angles a little above the bottom. When the plug is slightly raised, gas will flow from the gas vessel. In order that the lime or prepared material against which the flame of the ignited gases strikes may progressively rotate and present constantly fresh surfaces to the jet, motion is given to the lower disc or cup in which it rests by suitable maintaining power, and an upper disc or cup is employed to press on the upper surface of the lime or prepared material, in such manner that this plate may rotate freely with such material, and descend or ascend with it, the axis of the upper disc or cup being mounted on a bar which is arranged to slide freely through guides.

490.—SAMUEL RIDGE, of Hyde, Chester, millwright, for "*Improvements in coupling or making the joints of pipes and other articles.*" Patent dated Feb. 23, 1859.

This invention consists of certain improved modes of making joint rings to be placed between the flanges of pipes or other articles requiring to be coupled or jointed together. In performing this invention, use is made of a double frame made of lead, or other suitable metal or material, between which the cement is held. The inner side of this frame is by preference made of about the same size as the orifice in the pipes or other articles to be coupled or jointed together, and the outer part of the double frame comes either within the bolts by which the pipes or other articles are bolted together, or the bolts pass through the double frame. The double frame protects the cement from the atmosphere and from the air, water, steam, or other fluid in the pipes or other articles. In order to prevent leakage from the bolt-holes, a groove is made in the washers which contains cement, and a washer is placed under the head or under the nut.

These improved washers are chiefly beneficial in securing the manhole-frame to boilers, or in other cases where the bolt-head or nut is exposed to the steam or other fluid in the boiler or other article.

The claim is for the improved double-frame joints or couplings described, or any modification thereof for coupling or making the joints of pipes or other articles.

491.—WILLIAM ASHTON, of Heaton Norris, in the co. of Lancaster, for "*Improvements in gas-regulators.*" Patent dated Feb. 23, 1859.

This invention has reference to the apparatus commonly known as "Gas Regulators," and used for controlling the flow or current of gas from the street main to the burners or points of consumption, in order that the said gas may be supplied so as to issue from the burners under a uniform and equalized pressure irrespective of variations in the pressure maintained in the street main and in the number of burners to be supplied.

The pressure in the street mains or pipes through which the general distribution of the gas is effected is necessarily irregular, varying in different places and at different elevations at the same time, and subject to fluctuations at different times in the same place. These irregularities are further complicated in the branches or service-pipes through which individual consumers are supplied, by variations from time to time in the number of burners used, and consequently in the quantity of gas required for consumption. The gas-regulators most generally used to correct these irregularities operate by varying the aperture of a valve through which the gas is caused to pass, the said valve being connected with a moveable receiver actuated by the pressure of the gas in the branch after it has passed the valve. Augmentation of pressure in the receiver tends to close the valve, and thus compensates for the increased density of the gas by allowing it to pass only in diminished volume. Diminution of pressure, on the other hand, permits the valve to re-open, and thus maintains the equality of the supply by permitting the rarefied fluid to pass in a large volume. This arrangement however is defective, inasmuch as the one side of the regulating-valve being exposed to the branch or burner pressure, which is, or ought to be, uniform, and the other side to the street pressure, which is necessarily variable, it is impossible to maintain that state of equilibrium or indifference to motion in the valve which is indispensable for enabling the receiver to exercise an unimpeded control over the movements of the valve, and without which the rate of supply cannot be governed, as it ought to be, solely by the pressure of the regulated gas present in the branch.

This invention comprises three improvements, the first of which is intended to establish a state of equilibrium in the regulating-valve, so that the control of the movements of that valve by the pressure of the gas in the branch may not be interfered with by the irregular pressure of the gas in the street main. To prevent this, the access of the gas by the street main to the back of the valve is prevented by furnishing the latter with an arm or flange, partially immersed in mercury, forming therewith a mercurial or hydraulic joint or packing interposed between the back of the valve and the gas of the street main. The valve being thus insulated air is admitted to the back thereof by an aperture passing through the whole length of the valve-spindle, or made in the subjacent part of the box or chamber containing the valve. Or, otherwise, the gas of the street main is excluded from the back of the valve by means of the india-rubber packing or joint hereinafter described as the second improvement, and admitting air to the back of the valve as before.

The second improvement consists in the use of india-rubber for the purpose of forming the joint or packing by which the back of the regulating-valve is insulated. For this purpose a properly-shaped sheet of india-rubber is attached in one direction to the rim of the valve, and in the other direction to the chamber containing the apparatus, the breadth of material between the lines of attachment being in redundancy or excess sufficient to allow the requisite liberty of motion in the valve.

The third improvement consists in a like use of india-rubber in making the joint or packing to the hood disc or moveable diaphragm of the receiver, against or upon which the pressure of the gas in the branch is exerted in order to govern the opening to the regulating-valve.

The apparatus wherein the weight of the valve and spindle is large in proportion to the size of the regulating gasholder, the excess of weight is partially neutralized or countervailed by lining the rim of the valve or of the gasholder, or of both if necessary, with some light substance, which, without greatly adding to the weight of the parts mentioned, will considerably increase the displacement of mercury. The most suitable and convenient materials which have hitherto been discovered for the purpose are gutta-percha and cork, a layer of either of which may be easily fixed by cement or by pins passing through the rim. In gas-regulators, in which the bulk of the mercury displaced by the rim of the valve is sufficient to counterbalance the weight of the valve and spindle, or which are provided with counterweights for neutralizing the effect of the same, this lining will not be required.

The claims are—

1. The method or methods of establishing and maintaining a state of equilibrium in the regulating-valve by excluding the high-pressure gas or the gas of the street main from the back of the said valve, and by admitting air thereto in either or any of the manners heretofore described, however varied or modified.

2. The application of india-rubber as a means of forming a joint or packing to effect the insulation of the back of the regulating-valve.

2. The application of india-rubber in making the joint or packing whereby the gas is confined within the regulating gasholder or receiver, without preventing the motion of the disc which forms the top of such receiver in manner hereinbefore described.

527.—John Leigh, of Manchester, surgeon, for "*Improvements in the purification of coal gas.*" Patent dated Feb. 28, 1859.

This invention consists in the constant and extensive use of gas-water, commonly called ammonia-water, in the purification of coal or cannel gas, the object of such use being the removal of various salts of ammonia from the gas. It is well known that coal or cannel gas contains, before its purification, a large quantity of ammonia combined with carbonic acid, hydro-sulphuric acid, prussic acid, &c., and for the removal of this ammonia from the gas various substances have been employed, such as sulphate of iron, salts of manganese, sulphurous acid, &c.; but, instead of these, the patentee washes the gas in suitable vessels with the gas-water or ammonia-water itself, by which he finds that all the ammonia salts in the gas are removed.

The apparatus employed for the purpose may be of any convenient size or shape. In the one shown in the drawing attached to the specification, the ammonia-water is supplied at the upper end of a deep vessel by an injection-pipe, and spread about by a dispersion-plate. At intervals in the interior of the vessel are grids, each of which is covered with materials to retard the return of ammonia-water, and thus afford time for it to mix with and purify the gas; the said materials being composed of bricks, ashes, or other suitable substances.

The patentee does not claim any particular kind of apparatus for carrying out his invention, but he claims the washing of coal or cannel gas in suitable vessels with the gas-water or ammonia-water, for the purpose of removing the ammonia salts therefrom.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

1788.—John Hewett, of the firm of Hewett, Allott, and Walker, accountants, of High Street, Sheffield, for "*Improvements in self-acting water-closets.*" Aug. 3, 1859.

1795.—William Henry Maxwell Blews, of Birmingham, manufacturer, for "*A new or improved regulator for gas-burners.*" Aug. 3, 1859.

1797.—Thomas Lister, of Sheepbridge, Derby, engineer, for "*An improved sanitary water-closet.*" Aug. 4, 1859.

1810.—Francis William Beaumont, of Clapham, Surrey, civil, mechanical, mining, and gas engineer and surveyor, for "*A hydraulic apparatus, applicable to transmitting, regulating, and measuring the supply or flow of liquids.*" Aug. 5, 1859.

1828.—John Henry Johnson, of 47, Lincoln's Inn Fields, and Glasgow, for "*An improved signal-light, and in the apparatus employed in the production thereof.*" A communication. Aug. 8, 1859.

1835.—Thomas Dunn, of Manchester, engineer, for "*Improvement in machinery and apparatus for elevating and regulating the level and flow of liquids, part of which is applicable for propelling vessels.*" Aug. 9, 1859.

1854.—John James Speed, the younger, of the city of Detroit, U.S.A., telegraph engineer, for "*Improvements in the manufacture of pipes, tubes, and hollow cylinders.*" Aug. 10, 1859.

1859.—David Hulett, of 55 and 56, High Holborn, London, gas engineer, and George Prudden, of Shefford, Beds, gas engineer, for "*Improvements in apparatus for the manufacture and distribution of gas, and in apparatus applicable for internal or external illumination.*" Aug. 11, 1859.

1889.—William Gossage, of Widnes, in the co. of Lancaster, chemist, for "*Improvements in the treatment of certain offensive liquids, and of noxious gases liberated from such liquids.*" Aug. 16, 1859.

1901.—Hyam Jacob Hyams, of Holywell Street, Westminster, gas-meter maker, for "*Improvements in the construction of wet gas-meters.*" Aug. 18, 1859.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

853.—George Frederick Chantrell, of Liverpool, furnace engineer, and Edward Dutch, of the same place, commercial traveller, for "*Improvements in the apparatus for regulating the quantity of water to be used for the flushing of water-closets, and other purposes.*" April 5, 1859.

969.—William Prosser, of 24, Dorset Place, Dorset Square, London, gentleman, for "*Improvements in apparatus employed in the production of light.*" April 18, 1851.

1091.—Joseph Souquière (called Émile), of 29, Boulevard St. Martin, Paris, civil engineer, for "*A new or improved process of distilling coal.*" April 30, 1859.

1626.—Elijah Livermore, in the city of New York, U.S.A., for "*Improvements in the manufacture of burning fluids for illuminating and heating purposes.*" A communication. July 8, 1859.

Parliamentary Intelligence.

WIRRAL WATER BILL.

THURSDAY, JULY 14.

(*Before the Duke of* Montrose, *Chairman, Lord* Ravensworth, *the Earl of* Cork, *the Earl* Pomfret, *and Lord* Belmore.)

The consideration of this bill, which had been adjourned for ten days in order to obtain a report from the Home Office, was commenced this day.

Counsel for the promoters were Mr. Hope Scott, Q.C., Mr. Burke, Q.C., and Mr. Rodwell; for the petitioners against the bill—Mr. Calvert, Q.C., and Mr. Johnson.

Mr. Burke said many applications had been made at the Government Offices for the report of Mr. Edward Dickens, who had been commissioned to inquire into the manner in which a poll of the inhabitants of Tranmere had been taken, but he was sorry to say it had not been obtained. A letter had been received from Sir G. C. Lewis, suggesting that the best course would be to move the Lords' Committee to send a request to the Home Office for the production of the report, which would then, he apprehended, be immediately sent.

The Chairman said the committee had already sent several times for it, without success.

Mr. Burke having read the letter would make a suggestion to the other side, which, he thought, might save their lordships all trouble, and would be entirely consistent with fairness. The case had not yet been opened before their lordships, but he might state that it had been fully investigated in the House of Commons, and its merits proved to their entire satisfaction. And, although some of his friends would take issue to that, he was entitled, having obtained the verdict of that tribunal, to say that the case had merits of its own, or the bill would not have passed. The opposition which had been directed against him by several influential parties had been entirely removed; and, in fact, there was now no petition against the preamble of the bill. There had been a petition of the Birkenhead Commissioners, who thought that the proposed works for the supply of water to the district would interfere with the other works for the supply of Birkenhead. But negotiations had taken place, and he was happy to state that the engineers on both sides were satisfied with an arrangement which had been concluded, that the promoters of this bill should remove their wells to the greatest practicable distance from the wells of the Birkenhead Commissioners. The engineers would, if necessary, give evidence before their lordships to that effect. The only remaining petition was one from the inhabitants of Tranmere. They confessed the preamble so far as the establishment of a water company was concerned. They distinctly stated in their petition that there was a great drought of water. Tranmere was, in point of fact, languishing for water, and it was therefore desirable that water-works should be established. That was the case of the promoters: they stated that water-works ought to be established, and therefore the two parties were so far in accord. The only question at issue was how the town should be supplied. They said—and the idea had newly come to them since the Wirral Water-Works Company had been established, by reason, he believed, of a once hostile personal feeling to which he did not wish to advert, as much opposition had been got up to the promoters rather than to the scheme itself—"Granted the fact that Tranmere ought to have a fresh supply of water, we think it ought to be done by the Local Government Board, and not by a private company." That, however, was a new idea. No doubt, if Tranmere wanted water last year, the inhabitants might have introduced the Local Government Act, if they thought fit; but no steps had been taken for the purpose till the Wirral Water-Works Company was established. Efforts were made in the town to defeat this bill by means of an opposition directed to that one point—the preference of the inhabitants to adopt the Local Government Act instead of having a private company. The ground taken by the promoters, and the great portion of those who acted with them was, that whereas the supply of water to a town was a speculation, it was more beneficial to the town that the speculation should be undertaken by a company at its own risks than at the risk of the ratepayers. Moreover, by the Local Government Act it was provided that, within a period of twenty years, the whole capital expended for making the works, as well as the expense of maintenance, should be repaid by the inhabitants, so that at present the inhabitants of the town would have to pay for their successors after twenty years. That was a point that might fairly be discussed between the parties. He (Mr. Burke) would be in a condition to prove that the majority of the respectable inhabitants and the large ratepayers of Tranmere concurred with him in his view, and did not think it in the slightest degree expedient that the proposed Local Government Act should be introduced. There were, however, parties who stated the converse; and those parties got up a meeting, at which resolutions were passed for the introduction of the Local Government Act. The promoters took exception to the meeting, and stated that it was not fairly convened, and afterwards a poll was taken, and they contended that the poll was most unfairly conducted, and that the returning officer was a gentleman notoriously in the interests of the other side, that he exercised such undue influence and adopted such an extraordinary course, that the poll was not worth the paper on which the votes were written. They accordingly memorialized the Home Office; and what they had been desirous to have was the report of the officer who had been sent down, and who expressed in that report an opinion as to whether the poll had been fairly taken or not. If it had been unfairly taken, they would have been in a condition to ask the committee to deal with the bill as if it were an entirely new matter. But failing in obtaining that report until they knew what the opinion of the officer was, though they believed from what they knew of the state of the facts that it could only be one way, they were not in a position to avail themselves of the fact, and were constantly met on the other side by statements that the town was opposed to the bill. What he would propose was perfectly fair; he might be right or wrong in the assumption that the town was not against him, but with him. He would, however, propose to the other side that they should let the bill pass. There was an assumption on their part that water was wanted at Tranmere, and therefore it must be a point to establish water-works. But if, within six months from the present time, the town chose in a regular manner, and upon a fair poll being taken, to introduce the Local Government Act, and should then require them to supply the town with water, the company should be bound

within twelve months to hand over to them at cost price every pipe they had laid down in the town of Tranmere. By adopting this clause, all that unpleasant discussion would be avoided which would otherwise have been gone into, and a large amount of evidence would be saved which it was certainly not very desirable to introduce. The proposed clause was in the following terms:—"That if the Local Government Act of 1858 shall be adopted in the township of Tranmere within six months after the passing of this Act, and within the following six months the Local Board of Health for such township shall have determined to construct water-works for the supply of such township, the company shall be bound, within one year after the determination of such local board, on being requested in writing so to do, to sell and transfer to such local board all such of their mains and pipes within the township of Tranmere as shall not be required for the supply of water to the other parts of the district within the limits of this Act, on receiving from the local board, in payment for the same, such a sum of money as it shall have cost the company to provide and lay down such mains and pipes." Nothing, he thought, could be clearer or fairer than this arrangement.

Mr. CALVERT wished to know why his learned friend had not communicated his proposition to the opponents of the bill.

Mr. BURKE said he did not know that he should not have been able to have obtained the report.

Mr. CALVERT contended that the report would only deal with the question whether the poll was fairly taken.

The CHAIRMAN said it affected the question whether the poll was against the company or not.

Mr. CALVERT did not think so, because the poll would have been improperly taken, but it still might have been very much one way. The majority was a large one—130. It was right that their lordships should be disabused of some part of his learned friend's statement. The decision of the House of Commons was founded on a point of law taken in reply, in the absence of himself and his learned friends. It was certainly very unfair to introduce it in reply at all. The committee of the House of Commons did not conceive that the Local Board Act would allow the inhabitants to supply the town with water; but that opinion was perfectly erroneous, for there was not the least difficulty about it. The Board of Health could enable local boards to open streets, and to take all such measures as might be necessary to supply the town with water. His learned friend said that the opponents confessed the preamble, but this was a total mistake.

Mr. BURKE: Your confession goes to the desirability of a supply.

Mr. CALVERT: No doubt a supply is very desirable.

The CHAIRMAN: The only question is, who shall make it?

Mr. CALVERT said that was the question of the preamble, and it was quite impossible for the opponents of the bill to recognize the notion of a company making the supply, because they had been warned by the companies of other towns. The works at Birkenhead cost £50,000, and the people had to pay £200,000 for them. Liverpool was in the same position in the long run; the town had to buy up the works at a large increase upon their cost.

Mr. BURKE: That is not my clause.

Lord RAVENSWORTH: In your clause you limit the time?

Mr. CALVERT: If they will give us twelve months perhaps it would be worth consideration, but six months is not enough.

Lord RAVENSWORTH: The time strikes me as being rather short.

Mr CALVERT would be very happy, if possible, to avoid discussion; the time proposed was, however, not sufficient. The following letter had just been received from Mr. Tom Taylor:—

Local Government Act Office,
Richmond Terrace, Whitehall, July 14.

Sir,—I am requested by the Secretary of State for the Home Department to inform you that on a full consideration of the circumstances attending the proceedings at a poll on a resolution for the adoption of the Local Government Act in the parish of Tranmere, he has come to the conclusion that the vote on that poll is not valid, and that an order to that effect will be issued forthwith. This order will in no way preclude the taking of proceedings *de novo* for the adoption of the Act. I am to express his hope that if proceedings be taken, those irregularities which appear from the evidence as given at the inquiry before Mr. Dickens, the inspector from this office, to have occurred in the conduct of the poll under the Local Government Act, will be avoided, and that the district will be still enabled to obtain the powers for its own improvement, which are stated in the memorial received by him on Saturday last to be so urgently required.

I have the honour to be, Sir, your obedient servant,
TOM TAYLOR.

He was instructed to say that six months was certainly not long enough. If his friend would extend the time to twelve months he would consent. He had intended to propose the following:—"That nothing in this Act contained shall operate to prevent the owners of property and ratepayers in the township of Tranmere, in the event of any local board being established within such township under the powers of the Local Government Act or otherwise, from promoting or establishing of works for the supply of water to the town, such local board always making payment to the company for the value of such mains or pipes as shall be laid down by the said company in the said township, or such value to be obtained in the maner provided for by the Lands Clauses Consolidation Act in respect to the settlement of disputes by arbitration." The main difference between the two clauses, as far as he knew, was, that in one case there was a limit of time, and in the other case there was not. What he was anxious to provide against was the recurrence of irregularities. The poll might have been in the hands of both parties, and the irregularities would be followed by appeals to the authorities in London, and it was impossible to say to what extent of time it might be carried. If it was known that time would not prevent the works being transferred from the company to the local board, he thought these irregularities and appeals would not take place, and there would be no vexation; but if the time were limited, there would be continual vexation, and on this ground he considered that his clause was the best.

Lord RAVENSWORTH: *Nullum tempus.*

Mr. CALVERT: If there was *nullum tempus*, there would be *nulla vexatio*. Their lordships would see there was to be a period of six months, and six months only, "if the Local Government Act should be established in the township of Tranmere within six months." Now the overseer was the authority who conducted this matter, and the overseer happened to be the friend of the company, and a very active one; in fact, he refused recently to do his duty, and another person was appointed. Under the Act, the committee were aware it was necessary to apply to the Secretary of State to appoint another person to conduct the proceedings, if the overseer thought proper not to do so. And the Secretary of State had consequently to be applied to. The overseer would be in office six months, and that, he said, was another reason why six months was not enough. Why not immediately? Within one year the company were to incur any expense they pleased without any control, after it had been determined that the works were to be the property of the inhabitants and not of others. It was further proposed that the local board should have transferred to it all such of the mains and pipes within the town as should not be required to supply water to other parts of the district within the limits of the Act. Here the question should be, what the board wanted, not what the company wanted, to keep. If they chose to embark against an unwilling district in an arrangement of pipes, some of which were required for that district, and some not, the question should be, not what the company wanted for their service, but what the town wanted; and the board should be allowed to purchase all that was necessary. What the opponents were willing to do was to limit the time to eighteen months. That would keep clear of the question to which his learned friend alluded, with regard to the period. The committee would see that, according to the proposition of his learned friend, the inhabitants were to have no control over the expenditure, and the mains and pipes were to be taken, not at their value, but at their cost, which might be excessive.

The CHAIRMAN thought the value should be determined by the value of the pipes, and not by their cost.

Mr. BURKE had not the slightest objection to a reference to determine the value. It was, however, very desirable that there should be some definite period fixed, and that the subscribers should have some prospect of a return for their capital. No doubt if the company were deprived of Tranmere they would lose a considerable amount of revenue, because the works they proposed to construct would enable them to supply that town. It was also not at all desirable to keep alive the agitation for a long period. The company was limited to two years for the completion of the works; and there was a large amount of personal feeling, which had induced persons to attempt to delay the proceedings of the company. It would be desirable to settle the matter as soon as possible; and the committee would see that until it was settled the company would be crippled in their operations. They would not be disposed to pay much for the benefit of the town of Tranmere until it was determined whether or not they were to have the supplying of it. It was therefore for the benefit of Tranmere as well as the company that the time should be limited. The Local Government Act may be introduced in a month.

Mr. CALVERT: Our proceedings were not limited to a day; we have just got the decision from the Home Office.

Mr. BURKE contended that the Act might be put into operation almost immediately, and apprehended also that the overseer would be compelled to do his duty. His learned friend admitted that, in the event of his not doing his duty, there was an immediate remedy by an application to the Home Office. The whole matter might, therefore, be settled in two or three months. Certainly, six months was a very long period. And it was exceedingly desirable, the inhabitants of the district being now in hot weather, that they should have a supply of water to cool them as soon as possible. With regard to the price to be paid for the pipes, he took exception altogether to his learned friend's argument, that the board were to be the parties to judge of it. For the purpose of supplying other districts besides Tranmere, a main must be laid through the town; and they could not be allowed to take that. The company were willing to sell all that was not required for the supply of other districts, and what the board did not buy they could lay down for themselves. It was not to be supposed that the company were going to lay down pipes for no earthly purpose; but, if they once laid them down, and wanted them themselves, the board would not have to buy them. If they did not buy them, they would buy others. If they did, they would pay for them what they cost the company. If there were any difference as to the propriety of the outlay, there would be no objection to go before a referee.

Mr. CALVERT: Of course it would be quite out of the question we should pay whatever costs they choose to incur in the year.

After some further discussion the room was cleared. On entering,

The CHAIRMAN said the committee have taken into consideration the two clauses, and they have made some alterations combining the two which they think will probably meet the point. We begin with the clause given in by the promoters of the bill, and have made an alteration at the beginning:—"If the Local Government Act of 1858 shall be adopted within the township of Tranmere within nine months after the passing of this Act, and within the following six months the local board of health of such township shall determine to construct water-works for the supply of such township, the company shall, within one year after such determination of such local board, sell and transfer to such local board all such of their mains and pipes within the said township of Tranmere as shall not be required for the supply of water for other parts of the district within the limits of this Act, on receiving payment of such local board of such value as shall, in case the difference be ascertained, in manner provided by the Lands Clauses Consolidation Act, in reference to the settlement of disputes by arbitration."

Mr. BURKE proceeded to add—"On receiving from such local board, in payment of the same, such a sum of money, as in case the difference shall be determined by arbitration, on a fair and proper consideration of the expense incurred."

The CHAIRMAN said the committee thought the plan determined upon was better than arbitration, because it might be a question who should pay the arbitrator.

Mr. CALVERT: What we want is value.

The CHAIRMAN: It does not follow, if they choose to pay a very outrageous price for their pipes, that you should pay it; but I think it should be ascertained what would be the fair value.

Mr. *Cunningham*, the engineer of the company, was then formally examined by Mr. GREGORY. He said: I am a civil engineer resident at Birkenhead, and an engineer of the proposed works. I laid out the plan for them. I have read the preamble of this bill, and know the allegations as to the inefficient supply of water for these townships, and the necessity for a further supply. They are quite correctly stated. A large number of vessels anchor in the Sloyne, and take in water there. A large number of the inhabitants are anxious about the supply. The proposed works are sufficient for the purpose. The water is obtained from the old red sandstone by boring and sinking, and is of a good quality. There are two reservoirs proposed, one at Oxton for the supply of Oxton Noctorem and Brenton, and the other at Tranmere. If the inhabitants of Tranmere obtained their local Act and the power of purchasing, they would have to erect another reservoir and a water-tower. The well has been carried so as not to interfere with the well of the Birkenhead Commissioners, and to prevent any chance of the one draining the other.

Mr. THEODORE MARTIN: I understand the Birkenhead Commissioners have no power to supply water in Tranmere; our right is not to be interfered with by the commissioners.

Mr. GREGORY: This is a new point entirely.

The CHAIRMAN: Your clause does not prevent them from supplying the town.

Mr. MARTIN: If the clause had passed in its original state, it would have

been sufficient for the purpose, but now it is modified it will not carry out the intention; and I submit it should be made quite clear, that if we are to purchase their mains and pipes, they should be put under condition not to supply Tranmere, as we cannot supply it without purchasing their pipes. If we do purchase them, they should cease to have any power to supply it.

The CHAIRMAN: It is not in your clause.

Mr. MARTIN: It does not appear *totidem verbis* in the clause as it now stands, but if we had purchased all their pipes and mains they could not have supplied the town.

The CHAIRMAN: They might have laid down more.

Mr. MARTIN: We should have taken the hazard of that.

The CHAIRMAN: But you can now take all except those that are wanted for other purposes.

Mr. MARTIN: But if they have mains passing through our township which they do not part with to us, we should be exposed to the hazard of their establishing water-works there.

Lord RAVENSWORTH: This point ought to have been urged when the difference was first started.

Mr. MARTIN: We thought it was quite clear, and that the discussion between us was that there should not be two sources of supply.

The CHAIRMAN: I do not see that your clause would carry out your meaning.

Mr. JOHNSON contended that there was no notion of establishing in Tranmere a competing source of supply; and the opposition of the opponents of the bill would be entirely obviated and subverted if the committee allowed the company as well as the local board to have the power of supplying the town.

The CHAIRMAN said the committee certainly never understood that there were to be competing powers.

Mr. JOHNSON: We only want to make that perfectly clear.

The CHAIRMAN: I think the committee are all of the same opinion, that if there was a local Act, it was not intended that the company should supply Tranmere, although they might have mains through it to supply other places.

Mr. GREGORY said it was a matter of indifference to the company, only it might be for the advantage of the inhabitants. They would all have to pay the rate if they constructed their own works, but it was possible that on account of the company's water being better, or more easily supplied, some parties might prefer it.

Mr. JOHNSON: You surely are not arguing this question?

Mr. GREGORY: You have raised it.

Mr. JOHNSON: We propose to put in words to this effect—"And that when such local board shall establish the water-works for supplying the township of Tranmere, the powers of the company to supply water to the said town shall cease and determine."

Mr. GREGORY: Not before you have paid for our pipes.

Mr. JOHNSON: We cannot establish the works without paying for them.

Mr. GREGORY suggested that the company should not have the power to supply water to any person within the township.

Mr. JOHNSON said that water might be supplied for other than individual purposes. Do you incorporate the Water-Works Clauses Act?

Mr. GREGORY: Yes.

Mr. JOHNSON: Then I think the words will do, because it is there made wide. There is a power of supplying shipping, and I do not think that is in the Water-Works Clauses Acts.

Mr. GREGORY: That is in the river.

Mr. JOHNSON: It is within the township of Tranmere. I can see obviously the attempt to get some powers which your lordships do not intend the company to have. The anchorage, I am told, is within the township of Tranmere, and it may be, perhaps, one of the main sources of our revenue. If they were excluded from other sources of supply within Tranmere, that would exclude the shipping as well, and would answer every purpose

This suggestion having been agreed to, the remaining clauses were gone through, and the bill passed the committee.

Legal Intelligence.

LAMBETH POLICE COURT.

MONDAY, AUG. 15.

THE STRIKE AT THE LONDON GAS-WORKS (VAUXHALL).

Martin Ryan, one of the stokers lately employed on the works of the London Gas Company, in Lambeth, and at present out on "strike," was brought up on a warrant, and charged before the Hon. G. C. NORTON with violently assaulting Edward Macklin, and also with using threats and intimidation, to induce him to leave his employment.

The complainant said that for some time he had been in the employment of the London Gas Company as a flue-cleaner, and on Saturday evening last, on leaving off, he went with a fellow-workman to the King's Arms public-house to have some refreshment. The defendant, who was one of the men out on "strike," was there at the time, and asked him for a pipe of tobacco, which he gave him, but he no sooner filled the pipe than he dashed it on the ground, and not only smashed, but danced on it. He then asked for a second pipe of tobacco, and he (witness) perceiving his object was to pick a quarrel with him, gave him a second pipe, and this he served the same way as the first. He then commenced abusing him in gross language, and said that such —— had no right to be at work in the factory, and keep other men out of employment. He (witness) told him he had a wife and family to support, and could not afford to be idle, and handed him (the defendant) a glass of ale, and afterwards a second glass, with a view of averting his anger. The defendant, however, repeated his abuse, and said that, if others were of the same mind as himself, he should cut the —— out of all such persons as him who kept men out of work, and that, as long as they stopped in the factory, they should know no peace. The defendant after this made a rush at him, and was about to strike him on the face, but he threw up his arms to protect himself, and received two violent blows on the chest from him.

Mr. NORTON: What are your wages at the factory?

Witness: Twenty-four shillings a week, your worship.

Mr. NORTON: And what had been the wages of the defendant?

Witness: He was a stoker, and had twenty-nine shillings.

Mr. NORTON: And what did he strike for?

Witness: An increase of wages, sir; I think they wanted 35s. a week, he and the others.

Mr. NORTON: Was the defendant sober at the time?

Witness: No, sir, he was evidently the worse for drink; and I saw from the first that he wanted to quarrel with me. I felt it my duty to acquaint the manager with what happened, and he sent me to this court to apply to your worship for protection. I have always been kindly treated by the company, and I felt it to be my duty to do what I could for them.

William Sly, a fellow-workman, who accompanied the last witness on Saturday evening, corroborated his evidence in every particular.

Mr. *Richard Jones*, the chief engineer to the company, said that for the last fortnight the neighbourhood of the factory had been kept in a state of great disquietude by the conduct of the men who had struck, and it required the active interference of the police to protect the persons who were employed there from the threats and violence of those men who had thought proper to abandon their work. The company had made what they considered concession to the stokers by allowing each two pints of beer a day, and were willing to do anything in reason; but the demand they made was so unreasonable that they (the company) could not, under any circumstances, comply with it, and the consequence was a "strike."

In reply to the magistrate's questions, Mr. Jones said the hours of work were nominally twelve hours a day, but out of these they had not actually more than seven and a half hours' work, and for these they received 29s. a week. In conclusion, Mr. Jones said he felt it to be a matter of duty to attend to protect the workmen, and was extremely sorry for the cause. He also felt sorry for those who had, without sufficient reflection, abandoned a good employment, and were not sorry for what they did, and would not willingly return to their work; but others had been employed in their stead.

The defendant, in reply to the charge, said he was under the influence of drink at the time, and did not know what he said or did.

Mr. NORTON expressed his surprise at the extreme folly of a class of men who were more liberally paid for their work in this than in any country he knew of, and who from their earnings have beef or mutton for their dinners daily, allowing themselves to be led away by designing and interested persons. The workmen, as a class, were, in his opinion, very well paid, and contrasted their earnings with the miserable pittance allowed the police-constables, who, out of the twenty-four hours, were obliged to be on duty for sixteen, for something less, he believed, than 20s. a week.

The complainant expressed a hope that his worship would, as the present was the defendant's first offence, deal as leniently with him as he could.

Mr. NORTON observed he should very much wish to do so, provided he saw him (the defendant) sufficiently conscious of the extreme folly of which he had been guilty.

The defendant said he was very sorry indeed for what had taken place, and would willingly resume his employment if permitted: but—

Mr. JONES, in reply to the magistrate, said he could not of himself undertake to promise any such concession, especially as he had every reason to believe that he (defendant) was one of the most violent amongst the "turnouts."

Mr. NORTON said that in consequence of its being the first case, he should deal with it more leniently than the defendant deserved, and that was by sentencing him to three weeks' hard labour.

Mr. JONES begged publicly to express the company's and his own thanks to the police of the L division, for the valuable services they had rendered them since the strike of their men, in preserving peace and order, and protecting those on the premises.

Miscellaneous News.

ON THE ACTION OF ORDINARY LIGHTING OR COAL GAS ON VARIOUS SALTS, AND PARTICULARLY ON AN AMMONIACAL SOLUTION OF THE PROTOCHLORIDE OF COPPER.

By R. BŒTTGER.

(*Annalen der Chimie und Pharmacie*, vol. cix. p. 351.)

M. F. Leblanc was the first to observe the property possessed by the protochloride of copper, when dissolved either in hydrochloric acid or in ammonia, of absorbing carbonic oxide gas with a rapidity which he compares to that with which caustic potash absorbs carbonic acid. This observation was subsequently confirmed by M. Vogel.

At a later period, M. Bœttger, having attempted to purify ordinary coal gas from the carbonic oxide contained in it, by passing it through an ammoniacal solution of the protochloride of copper, found that the process did not succeed at all. Being induced by this result to repeat M. Leblanc's experiments, he declares that a current of carbonic oxide gas, even though very gentle, suffers no appreciable absorption whilst traversing successively three of Liebig's tubes containing the ammoniacal solution of protochloride of copper, and that this gas may remain for several hours in contact with this solution without any sensible appearance of absorption. There is here a contradiction which we will not undertake to explain.

On the other hand, M. Bœttger has obtained some remarkable products from the action of common coal gas on the above solution. Under the action of a current of this gas there is formed by degrees an abundant flaky deposit of a red cinnabar colour. As nothing of this kind results from the passage of a current of carbonic oxide, hydrogen, or carbonic acid, it is probable that this precipitate contains a combination of copper with one of the carburetted hydrogens of common gas. However, it has not been possible to obtain by direct experiment any analogous product either with marsh gas or with olefiant gas. The author has had no better success with benzine, or with naphthaline, or with the gaseous products resulting from the dry solution of a mixture of acetate of soda and lime and soda, amongst which are found various carburets of hydrogen, such as the propylène $C^6 H^6$, the butylène $C^8 H^8$, and the amylène $C^{10} H^{10}$.

It would seem that the analysis of this product ought to permit us to determine which of the carburets of hydrogen is found in combination with the copper. Unfortunately, it presents an instability, shown by the change of colour which takes place when we attempt to gather it on a filter and to wash it, which has hitherto prevented this determination. M. Bœttger, however, hopes to be able to conclude from his qualitative researches, that this product does really contain a carburet of hydrogen combined with the copper, and acting the part of a radical compound similar to cyanogen.

Common coal gas does not appear to produce any effect on the solution of the protochloride of copper in hydrochloric acid. But it gives rise to the red product equally with the ammoniacal solution of the hyposulphite of soda and protoxide of copper and with that of the cuprosocupric sulphite.

In the moist state this compound is a flaky, non-crystalline, and of a cinnabar red; when dried, it is of a violet brown. When folded dry in paper, and exposed on an anvil to the blow of a hammer, it is decomposed with sparks and a hissing noise, and leaves a large quantity of a very voluminous black powder, composed of minute particles of carbon and metallic copper. When heated in a test-tube it is decomposed at 95° to 120° (Reaumer) with detonation, leaving likewise a black pulverulent re-

siduum of copper and carbon, occupying at least three times its primitive volume.

In the moist state it is dissolved without any disengagement of gas, in largely-diluted hydrochloric acid, forming a greenish yellow solution, which is not rendered turbid by the addition of water, but from which caustic potash precipitates the original compound with all its primitive characteristics. Hydrochloric acid, of a density of 1·1, dissolves it without change at the ordinary temperature; but if it be heated, it decomposes very rapidly and with a copious disengagement of an inflammable gas, which burns with a vivid flame of a yellowish-white colour, forming a deposit of smoke-black. The remaining liquor contains only a hydrochloric solution of the protochloride of copper. Acetic acid, diluted sulphuric acid, potash, soda, and ammonia, have no effect upon this substance. The cyanide of potassium in concentrated solution dissolves it, disengaging the gaseous carburet of hydrogen. When immersed in an atmosphere of chlorine it produces a feeble detonation, accompanied by the emission of light, and there are formed a chloride of copper, hydrochloric acid, and an abundant deposit of minutely divided carbon. Bromine and iodine decompose it in a similar manner. When mixed with the chlorite of lead it detonates with the slightest friction.

When passed through an ammoniacal solution of the nitrate of silver, common coal gas produces a flaky precipitate at first of a reddish colour, but afterwards quite black. This product, when dried, detonates much more violently than the preceding one, either under a blow or under the influence of heat, leaving a considerable quantity of carbon in minute particles and of silver. It also detonates sharply in chlorine gas, or when mixed with powdered iodine. This product appears to differ from that which M. Vogel obtained by passing common gas through a solution of nitrate of silver. This last had a grey colour and a crystalline appearance. It detonates either by the application of heat, or when immersed in an atmosphere of chlorine. An ammoniacal solution of the chloride of silver does not yield this explosive compound.

Common coal gas, when washed in sulphuric acid in order to separate the ammonia, produces likewise, in a solution of the chloride of gold, a brown precipitate, which detonates with great violence when exposed to heat, after having been washed and dried.

M. Bœttger hopes soon to be able to determine more exactly the nature of these compounds. He informs us that the compound of copper may be obtained in great purity by passing common gas through an ammoniacal solution of protoxide of copper. It might produce, by two-fold decomposition, the explosive compound of silver, and for this purpose it is sufficient to stir it for a few moments, whilst yet moist, in a solution of nitrate of silver.

REPORT ON LIGHTING RAILWAY STATIONS WITH GAS ADDRESSED TO M. PERDONNET, MEMBER OF THE BOARD OF DIRECTORS OF THE EASTERN RAILWAY.

By Oscar Valins.

(*Nouvelles Annales de Construction*, February, 1859.)

I have the honour to submit to your notice a short report on the lighting of the stations on your line, for which you were good enough to place at my disposal the necessary information. I gladly embrace the present opportunity of repeating my acknowledgments for the assistance you rendered me in the accomplishment of this useful work.

The new system of lighting which I have the honour to submit for your examination, would be effected by means of portable gas. This gas is extracted from the Boghead coal, (in fact a bituminous schist from Scotland,) by a distillation similar in every respect to that undergone by coal in the manufacture of common gas. The products of distillation are of two sorts, gas and tar, which, when re-distilled and rectified, yields the bituminous oil now so extensively used.

I shall confine my remarks to the gas; and I would observe, in the first place, that its illuminating power has constituted it in effect a "portable" gas. The company, which even now sells considerable quantities in Paris and its environs, gives the following guarantee to its subscribers:—$3\frac{1}{2}$ cubic feet of portable gas consumed per hour give a light equal to 30 wax candles; and it is notorious that $3\frac{1}{2}$ cubic feet of coal gas, consumed in the same time, give only the light of 6 wax candles—that is to say, that in equal volumes, portable gas possesses five times as much illuminating power as coal gas.

We may remark, in passing, that this gas, as sold in Paris at 1 franc per mètre cube, is thus 33 per cent. cheaper than the coal gas sold at 30 centimes; we may also observe that its cost price, even in a less extensive establishment than that of Paris, would not reach the sum of 70 centimes per mètre cube.

The gas is carried about compressed in wrought iron cylinders, and M. d'Harcourt, in a notice published in the *Journal de l'Eclairage au Gaz*, has shown that the dead weight in the waggons, whatever might be the pressure of the gas, was 18 kilogrammes per mètre cube of gas, reduced to the pressure of the atmosphere.

The transport is effected in vessels charged under a pressure of 11 atmospheres; therefore, the apparatus employed in the transport of each mètre cube of gas in the compressed state represents a dead weight of $11 \times 18 = 198$ kilogrammes.

As the gas is discharged into receivers situated at the places of consumption at a pressure of 4 atmospheres, it remains at that pressure in the receivers for removal; so that 198 kilogrammes dead weight only serve in fact to transport 7 mètres cube of gas. Thus the actual dead weight per mètre cube is $\frac{198}{7} = 28{\cdot}3$, say 30 kilogrammes.

As 1 mètre cube of gas gives the light of 300 wax candles for one hour, burning during that time 3 kilogrammes of stearic acid, it is clear that the gas costs, in carriage only, ten times as much as the candle (*sic*), and that to transport 100 kilogrammes of gas and dead weight is the same as transporting the light of 1000 wax candles for one hour.

If I dwell on these remarks, it is with the wish to make it well understood how far "portable gas" is a movable merchandize—it is with the view to gain support to my opinion *that portable gas will become an important element of traffic* when sent from the great centres of population into small towns in connexion with the various lines of railway. It is for the railway companies to take the initiative; and there is a further reason for their doing so in the economy they will thereby effect in their own service, as will be shown at the end of this notice.

One hundred kilogrammes dead weight of cylinders contain 3·3 mètres cube of disposable gas, which, being manufactured by the company at 70 cents. would cost 2·31 frs., and would give the light of $5 \times 3{\cdot}3 = 16{\cdot}5$ mètres of coal gas. These 16·5 mètres cube of coal gas, at 30 centimes, would cost 4·95 frs.

Thus, so long as the railway does not expend in the carriage of 100 kilogrammes backwards and forwards between the works and the stations the sum of 4·95 frs.—2·31 frs.=2·64 frs., or, more simply, from the works to the station, $\frac{2{\cdot}64}{2} = 1{\cdot}32$ frs., that railway will obtain its light at a lower rate than the 30 centimes per mètre cube which it pays in its transactions with the ordinary coal-gas companies.

Let us select, as an example of the saving to be effected, that which may be expected on the line from Paris to Strasbourg. Take a station near the middle of the line—Bar-le-Duc, for example—and fix there a small establishment for the manufacture of the "Boghead" gas, two trucks, loaded with cylinders, would supply all the stations from Bar-le-Duc to Paris, and from Bar-le-Duc to Strasbourg. These trucks carry it, it is true, both to Paris and to Strasbourg, the entire dead weight of the gas consumed along the line; and it is the same as if the whole of the gas manufactured at Bar-le-Duc were conveyed to either of the extreme termini; but though it be admitted that it costs the Eastern Company 1·32 fr. to bring 100 kilogrammes from Bar-le-Duc to Paris, they would still be in a better condition than when paying throughout for coal gas at 30 centimes.

The Eastern Company uses oil for lighting; and in 1857 it consumed for its fixed lamps between Paris and Strasbourg—

Outer lamps	22,146	kilogrammes.
Square do.	5,075	,,
Signal-lights	5,868	,,
Total	33,089	,,

The average cost of the oil was 1·23 fr. per kilogramme. Thus the total cost amounted to $33{,}089 \times 1{\cdot}23$ fr. = 40,599 frs. The average consumption per day of these lamps was $\frac{33{,}089}{365}$, or 90·657 kilogrammes.

A Carcel lamp burns 42 grammes of oil per hour. The 90·657 kilogrammes consumed per day would, therefore, have given the light of $\frac{90{\cdot}657}{{\cdot}042} = 2159$ Carcel lamps burning for one hour. To give the light of a Carcel lamp we require a volume of gas equal to 30 litres per hour.

To replace the lighting with oil, the Eastern line would burn between Paris and Strasbourg 64,770 litres—say 65 mètres cube—of gas per day.

These 65 mètres cube, at 70 centimes, would cost . . . 45·50 frs.

—or, in one year, the expense would be $45{\cdot}50 \times 365 =$ 16,607·00 ,,

65 mètres cube of gas weigh, from what has been said before, $\frac{65 \times 100}{4{\cdot}33}$, or 1952 kilogrammes, to be conveyed every day from Bar-le-Duc to one of the extreme stations, and *vice versâ*. This would make a total weight, for the year, of 1952 × 365, or 713,000 kilogrammes. If we allow that it costs the company 5 frs. per ton for this carriage, we arrive at the annual expense of carriage—

$713 \times 5 =$ 3,565·00 ,,

Total annual cost	20,172·	,,
The same lighting has cost	40,599·	,,
Saving	20,427·	frs.

—that is to say, more than 50 per cent.

To this saving of 20,000 frs. between Strasbourg and Paris, we must add another, viz., that to be effected on the lighting by coal gas, as now in use. I have had no data to base my calculations on; but it is not the less certain that wherever the company uses gas for lighting, it pays more dearly for its light than if it were to use portable gas manufactured at one of its dépôts. From the foregoing figures we see that, when sold on the spot, the light afforded by a mètre cube of gas would cost no more than 20 centimes.

I do not propose to discuss in detail the advantages attending the substitution of gas for oil for lighting purposes. I think the figures I have given are of sufficient importance to attract attention, and to lead me to hope that you will deign to take them into consideration.

Receive, &c. (Signed) Oscar Valins.

EXPERIMENT ON LIGHTING CARRIAGES WITH PORTABLE GAS.

On the 10th December last, at 8 o'clock P.M., a first-class carriage, lighted with portable gas, left the station of the Eastern Railway at Paris, for Strasbourg. No change had been made in the lamps generally used, only gas had been substituted for oil. After a run of about 470 miles, extending over 13 hours, the breaking of the pipe by one of the attendants walking along the top of the carriage caused the extinction of the gas at Saverne.

The same carriage left Strasbourg again at 5.25 P.M., the pipe being protected by a small casing of wood, and the gas lighted half an hour before starting. The gas burned without interruption as far as Paris, that is to say, more than 13 hours, and during a journey of 310 miles. The light was white and steady, and attracted the attention of travellers at every station on the line.

The cost on the return was 11 litres per lamp per hour, or 3 centimes 3 tenths per hour for the whole carriage, or about 40 centimes for 12 hours' lighting—the length of the run.

The Portable Gas Company, which has, during the last six months, had an ordinary carriage lighted with gas traversing the streets of Paris, and during the same period has been soliciting the permission of the railway companies to make an experiment, of whose success it was assured before-

hand, has recently obtained the permission by the favour of M. Sauvage, engineer-in-chief to the Eastern Railway of France.

With these results before us, we can readily comprehend the importance of the employment of portable gas by railway companies, for the purpose of lighting the trains, stations, tunnels, signals, and various other objects.

EXPERIMENTS ON THE DISINFECTING POWER OF VARIOUS SUBSTANCES.

By Bodson de Noirfontaine.

(*Nouvelles Annales de Construction*, March, 1859.)

The summary given below is derived from particulars contained in a report by the commanding engineer of Lille, which has been communicated to us by M. Fervel, the commanding engineer at Meaux.

1. 6 litres of the solution of chloride of manganese, at 0·04fr. per litre, employed for the space of four days, were required to disinfect 18 litres of liquid taken from a cesspool—that is to say, 0·33 litre of the chloride to each litre of liquid matter. A rather less quantity of the chloride solution, employed on the instant, would probably have been sufficient for the momentary disinfection. Taking this reduction at 1-11th, we should require for the momentary disinfection of 1 litre of liquid matter 0·30 litre of solution of chloride of manganese, at 0·04fr., or an outlay of 0·012fr.

2. 20 litres of liquid fœcal matter were disinfected by means of 125 grammes of sulphate of iron, at 6frs. per quintal. The mixture having regained its odour in consequence of the naturally continued decomposition of such portions as did not contain an excess of the disinfectant, it was necessary, at the end of five days, to use an additional quantity of 5 grammes of sulphate of iron, in order to destroy the fresh exhalations. The momentary disinfection of 1 litre of liquid matter is thus effected by means of 0·00625k. of sulphate of iron, at 0·06fr. per kilogramme—say an outlay of 0·000375fr.

3. 150 grammes of sulphate of zinc, at 57·50frs. per quintal, were sufficient to disinfect 120 litres of liquid fœcal matter. The great difference in the disinfecting powers of the sulphates of zinc and of iron is explained, according to the engineer, by the circumstance that the first-named salt contains no water of crystallization, or at any rate, much less than the sulphate of iron. Thus, 1 litre of liquid matter would be momentarily disinfected by means of 0·00125k. of sulphate of zinc, at 0·375fr. per kilogramme—say an outlay of 0·00046875fr.

4. A demi-litre of the anti-mephitic liquid was sufficient to disinfect 120 litres of liquid fœcal matter. As the proprietor of this disinfectant would give us no information respecting its price, and would not undertake disinfection at low rates without numerous conditions, we cannot calculate the cost of disinfection by means of this agent under other circumstances.

In order to disinfect a given quantity, say 10·670 mètres of liquid fœcal matter, we should require, according to the experiments made at Lille—

3200 litres of chloride of manganese	costing	128 frs.
12·33 kilogrammes of crystallized sulphate of zinc,	„	5 „
66·67 „ „ sulphate of iron,	„	4 „

Moreover, from the same experiments, it would be very difficult to preserve the chloride of manganese in such conditions as would prevent its losing any portion of its disinfecting power.

COMPENSATING GAS-METERS.

The compensating meters of Hemming, Esson, and Allen, which we have previously noticed, depend for their action on the same principle as the bird-fountain, the water of the supply-reservoir being maintained in its elevated position by atmospheric pressure, and only allowed to flow out when additional air or gas is admitted, or when the gas is expanded by heat or by the diminished pressure of the atmosphere. In the class of meters we are now about to describe, the compensating action is entirely mechanical.

The first of these was invented by Mr. C. R. Mead, in 1851. The method he adopted to supply the waste caused by evaporation was to elevate the water from a reservoir by means of a scoop, actuated by a crank on the shaft of the measuring-drum, so that at each revolution the scoop dipped into a separate reservoir and raised a small quantity of water, which was poured into the measuring-chamber, so as to maintain the

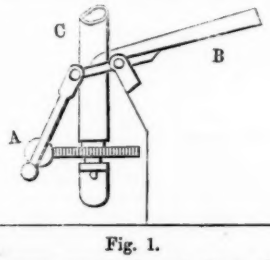

Fig. 1.

proper level. This arrangement is shown in fig. 1, where A is the crank connected by an arm to the end of a lever that elevates and depresses the scoop, B, at every revolution of the crank, and C is the pipe which contains the spindle that turns the wheels of the indices. An overflow-pipe into a waste-water box and a float for closing the inlet valve, should the level of the water sink too low, complete the compensating arrangements. For the prevention of fraud by perforating the drum through the outlet, a piece of tin was jointed to the top of the case and slightly tacked with solder at the opposite end; so that if any attempt were made to punch a hole in the drum, the solder would give way, and allow the tin to drop and prevent the meter from working.

This compensating contrivance was found to raise a much larger quantity of water than was requisite to supply the effects of evaporation; therefore, in the same year, Mr. Mead altered the arrangement in the

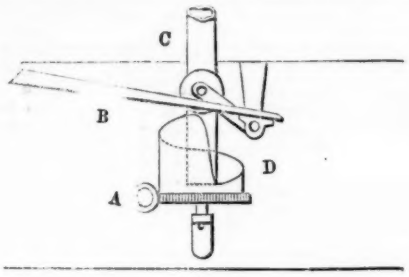

Fig. 2.

manner shown in fig. 2. He abandoned the crank movement, and worked the elevator by a spiral cam fixed to the spindle. A small wheel attached to the scoop rested on the cam, and as the spindle turned round, the wheel was forced up the cam, thereby elevating the end of the scoop and emptying its contents. It will be observed that by this arrangement several revolutions of the drum were required to produce one complete action of the scoop, the comparative movements being proportioned to the relative sizes of the pinion on the drum-shaft and the cog-wheel attached to the spindle. Neither of these compensating arrangements was made the subject of a patent.

In 1856 Messrs. Crosley and Goldsmith patented their compensating meter. In this meter a small cistern is attached outside of the meter-case, and two bent tubes, or scoops, fixed to a hollow axis take up water at each revolution, and empty it through that axis into the measuring-chamber. Motion is given to the elevating scoops by means of a cog-wheel that works into the teeth of a pinion fixed to the shaft of the drum. An overflow-pipe prevents the constant influx of water from overfilling the measuring-chamber, and as the waste-water box is connected with the supply-reservoir, there is an incessant flow and reflux, so that the waste-water box cannot be overfilled. If by any chance the water should fall below the proper level, a float-valve shuts off the supply of gas and extinguishes the lights. The overflow-pipe for the supply-reservoir is adjusted a little below the proper water level in the measuring-chamber, and dips at its lower end into a hydraulic seal cup. A small syphon is also fitted into the upper edge of this overflow-pipe, for the purpose of drawing off a certain quantity from the supply-reservoir. The two arms of the scoop being equally balanced, there is less irregularity in the action of this elevator than in a single scoop, and these meters are stated not to require more than about half a tenth of an inch of water-pressure to set them in motion. Messrs. Crosley and Goldsmith, in addition to the compensating arrangement, have adopted several plans with a view to prevent the meter from being fraudulently tampered with.

Mr. Scholefield, of Paris, is the next patentee of a compensating meter by mechanical action. The action of his elevator closely resembles the original one of Mr. Mead, the compensating apparatus consisting of a single scoop that is raised and depressed by a bell-crank lever, worked by a crank fixed on to the shaft of the measuring-drum. This arrangement

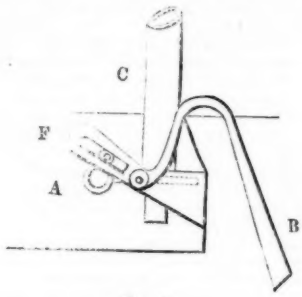

Fig. 3.

will be understood by reference to fig. 3, in which B is the scoop, A the crank on the axis of the wheel, and F the small end of the lever, with a slot through which the pin of the crank works. The water, as it is raised from the supply-reservoir, is emptied through a hole near the bottom of the scoop into a receiving-vessel and enters a regulating-pipe, down which it flows into the waste-water trough when the correct level is attained. Among other parts of Mr. Scholefield's meter which he claims as new are the cylindrical form of the casing, by which the manufacture of the instrument is simplified, and the partial division of the interior by means of a segmental division-plate; the back part containing the measuring-drum, and the lower part of the front division-plate forming the supply, the waste-water and the condensation trough. There is also a contrivance for preventing the meter from being overfilled, whereby if too much water be poured in, the supply of gas is shut off.

Mr. Wright, shortly before his death, introduced a modification of Mr. Mead's compensating meter, for the purpose of simplifying its action and of removing the inconvenience of the sudden descent of the water elevator after it had been emptied. The diagram, fig. 4, illustrates the plan adopted by Mr. Wright for raising and depressing the scoop, from which it will be perceived that instead of the spiral cam twisting round the upright spindle, his cam consists merely of an inclined circular band, D, and the elevator, B, is attached directly to an arm, the end of which rests on the inclined surface. It will be seen, therefore, that when motion is given to the spindle by the pinion, A, fixed on to the shaft of the drum, the bent end of the arm is forced gradually up the cam on one side, and descends gradually on the other, without any sudden fall; and in this manner the elevator is maintained in action with an uniform motion.

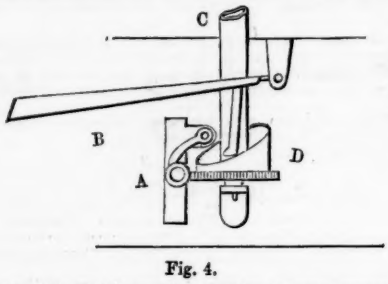

Fig. 4.

The other parts of Mr. Wright's meter comprise the most approved arrangements of overflow-pipes and floated valves to prevent overfilling or want of water.

In all the foregoing arrangements it will be noticed that the mechanism does more than is required, for the quantity of water necessary to supply the waste by evaporation is very much less than the compensator provides, and the meter consequently does an unnecessary amount of work. It has been already stated that Mr. Mead endeavoured to diminish the excess of compensation in his original meter by transferring the motion of the elevator from a crank on the shaft of the drum to a cam on the spindle, but even this slower movement of the elevator supplied much more water than was necessary. Mr. Mead has, therefore, very recently adopted and patented another arrangement, for the purpose of producing a much slower

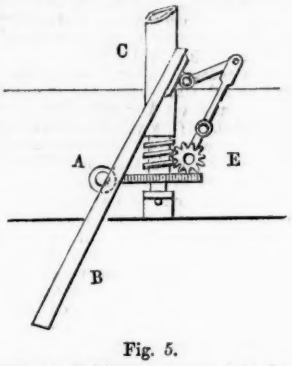

Fig. 5.

movement of the elevator. This arrangement is shown in fig. 5, from which it will be seen that an endless screw on the spindle communicates motion to a cog-wheel to which a crank is attached, and that crank raises and depresses the elevator. By this transference of motion from the drum to the spindle, and from the latter to a cog-wheel and crank, the movement of the scoop might be diminished so much as to be lifted only once in every 1000 revolutions of the drum.

It may be observed that when a proper overflow-pipe and a return of the water to the supply-cistern are provided, the only objection to the more rapid action of the scoop arises from the obstruction it offers to the motion of the measuring-drum, and that if the mechanism applied for the purpose of reducing the speed offer greater resistance to motion than the elevation of the superabundant supply of water occasions, the more complicated arrangement must be accompanied by a loss of power instead of being an advantage. The same object would be gained by greatly reducing the size of the scoops in the more simple arrangements, which seem unnecessarily large and clumsy; but if it be correctly stated, that Messrs. Crosley and Goldsmith's compensating meters require less than half-a-tenth of an inch of pressure to set them in motion, the resistance of the compensating apparatus can be scarcely appreciable.

In the next class of compensating meters we shall have to describe, the action depends neither on atmospherical pressure nor on mechanical elevation of the water, but on the principle of flotation.

PHŒNIX GASLIGHT AND COKE COMPANY.

The Adjourned Half-Yearly Meeting of the Proprietors was held on Wednesday, the 17th inst., at the Bridge House Hotel, Southwark—J. E. Johnson, Esq., in the chair.

The Secretary (Mr. Pridden) read the advertisement convening the meeting, also the minutes of the last half-yearly meeting, and the *pro formâ* meeting of July last (pursuant to Act of Incorporation), from which this was an adjournment.

The report of the directors and statement of accounts (a copy of which appeared in the last number of our Journal) having been previously sent to the shareholders, were taken as read.

The Chairman: Gentlemen, it becomes my duty now to advert to some of the leading features in the proceedings of the company during the last half year. You have all of you the accounts before you, and upon looking at them you will perceive that there is a little deficiency in the gains. They are not quite so great as they were in the previous half year, but those who have carefully analyzed these accounts will have no difficulty in arriving at the conclusion that that circumstance is explained by the smaller amount which we have obtained for our coke. The truth is that we have only got 8s. 3d. this half year, instead of 9s. 3d. as in the previous one, and this 1s. per ton will considerably more than cover the deficiency I am speaking of. But, in fact and in truth, that is not the whole cause of the different result of our working, because there are some things up and some down in the accounts which really affect them considerably. In the first place, we are paying more for our coals. Gentlemen have generally fancied that coals are at a very low price indeed, and will be surprised, perhaps, when I tell them that during the last half year they have cost us pretty nearly 1s. per ton more than they did in the preceding. You are all aware that about that period the Italian war broke out. The consequence was, that freights became very high, and it was feared that they would advance very much more. This increased freightage, although only temporary, affected us for a little time, and there were certain other things which tended to keep up prices. You are aware, of course, that we do not insure our coal ships. The amount which would be charged for insurance to a company like ours, having, perhaps, some twenty ships or more upon the water, would be so formidable a matter, that, as the result of long experience, we have found it much the best to be our own insurers. The company have been upon the whole exceedingly fortunate in this respect, but during the past half year we have had losses—not entire losses, but some of our vessels have, from stress of weather, been obliged to put into ports between Newcastle and London, where the coals have been sold at a lower price. These facts will explain how it is that our coal account is higher this half year. Tradesmen's bills are a little lower, and the expenses on meters are also a little lower. When I speak of a little, I mean 2d. per ton, in the one case it being 1s. 5d., in the other 1s. 3d. Wages are higher, being 6s. 2¾d. as against 5s. 8d. This has arisen from the large amount of works which have necessarily been engaged in. Other things remain much the same. The total amount of working cost is about 2s. per ton more than it was last half year, but the rental covers that to a great extent, for it is a little better than it was last half year. The cause of the rental being better is, that a larger amount of gas has come into account. You will remember that we have had to report in former times a considerable waste: I am happy to say that latterly it has been very much less. Gentlemen who are connected with gas companies have different calculations as to what the amount of waste should be. Some companies reckon that they make 9500 feet of gas per ton, others 9400, and others again 9200; but we have really never calculated more than 9000 feet. We measure our gas when it passes through the meter in a state of high temperature and when it is much expanded and will measure more than when it reaches the burners of the consumers. You may naturally fancy that in the winter months, when a great amount is consumed in the street lights, the gas reaches the burners in a very condensed state, and we think that 9000 feet per ton is not an unfair standard to assume. Taking that as the basis, the waste this half year is only 7⅜ per cent., an exceedingly small amount. This is one reason why the rental appears so much better. The quantity of coke which has been made is exceedingly satisfactory. The consumption for fuel has been only 15½ per cent., generally it has been about 20 per cent. In tar there is a little deficiency, but in ammonia a very large excess. It is, perhaps, somewhat of an anomaly in the accounts of a gas company to find that more has been made by ammonia than by tar, though one is 4s. 6d. per butt and the other 7s.; and it is the impression generally, upon a rough estimate, that the amount of each is exactly alike. That is, however, not so; we make considerably more ammonia than tar, which may be explained by the fact that in recent days there has been a great anxiety that the gas should be perfectly pure, which obliges us to take pains to wash out as much of the ammonia as we possibly can. These, gentlemen, are the general features in the accounts, and the only ones upon which I think it necessary to dwell. Before I sit down, however, there are one or two things out of doors to which I think it advisable briefly to advert. When I had the pleasure to address you at our last meeting, I told you that we had been charged with robbing the public very extensively with regard to the public lights. It was said that we were contracting to give 5 feet per hour, but that, in fact, we gave them nothing like that quantity. We felt it necessary to have this point thoroughly and fully investigated. We therefore appointed two engineers of great experience and high character to go into the subject, and upon this point we were united and joined with all the other companies on this side of the water, for they felt it was a question in which we were all concerned, and they made common cause with us to have it investigated and set right. We have had the reports of the gentlemen who were appointed by us, and the result is, that so far from not giving 5 feet per hour to the public lights, it is satisfactorily proved that we are giving them a little more than 5½ feet per hour. Hence we may explain, in some degree, how the waste in this company arises, because, upon the whole, we have no doubt that the large bulk of our gas consumers are respectable and honest persons, who would not sully their fingers by robbing us of our gas. There may be one or two instances in which dishonest practices prevail, but as a body I believe our customers are entitled to our respect, and are to be trusted by us with confidence. It is not in their case that this waste arises, but in the case of the public lights. Indeed, when we find that we are giving this quantity more than is contracted for, we are pretty well justified in drawing the conclusion that here is to be found the explanation of so much of the waste in all companies. Gentlemen, during the past half years two bills have been before Parliament, which have necessarily occupied the attention of all persons concerned in gas-works. One of these bills had for its object the entire regulation of gas matters in the metropolis. It proposed to fix a maximum price to be charged; and the maximum proposed was an exceedingly small one. There were arbitrators to be appointed to settle all differences, and the mode of their appointment was exceedingly objectionable; and there were very many other things in that bill which, if it had been passed, would most assuredly have tended to depreciate the value of gas property. The companies, therefore, felt it their duty to oppose that measure. It was, however, necessary for them to do but very little in reference to that opposition. The bill was brought in hastily, and the standing orders of the House of Commons not having been complied with, it was felt that that was a very easy mode of disposing of the matter. Advantage, therefore, was taken of it, and the bill was withdrawn. It is not, gentlemen, that we at all object to the passing of some bill upon this subject, but we are glad that this bill was not passed, because we feel that the longer the subject is considered by candid, prudent, and impartial men, the more likely we are to get a bill which will be satisfactory to all parties, and which will consolidate and promote the interests of gas consumers and of gas proprietors. With regard to the Meter Bill, that was much less objectionable. It set forth two great principles which the directors of this company and of every other company on this side of the water have long deemed to be necessary. It was felt right that there should be a standard by which to ascertain what a meter should really contain. We, I say, felt so some years ago, and we appointed a meter inspector, who has a standard meter, and that one a meter containing the amount which it has just been decided by the new law is a just and proper amount. That person is required thoroughly to examine all meters which may be brought to him for inspection. The expense of examination is very small, and where a meter is found to register incorrectly a diminution in charge is made by the gas companies. The principles which are laid down in Lord Redesdale's Bill are just those which we not only deemed to be right, but which we have acted upon for several years past. If there be one feature in that bill which may occasion us some difficulty, it is the extreme amount of accuracy which it requires in the registration of all meters. We must bear in mind that a meter is like a watch or a clock—it is a piece of machinery working by mechanism, and liable, therefore, to get out of order. It is to be feared, then, that a degree of accuracy is

required which it will be very difficult to obtain, and that eventually we may be put to some considerable expense on the score of meters. Whether the bill is a practicable one or not, I do not know, but I have no doubt it will lead men of high scientific attainment to turn their attention to the construction of gas-meters, and perhaps by-and-bye we may have an altogether better instrument. The only thing in that case will be, that you will have from £12,000 to £20,000 worth of meters thrown out of use. Such, however, is not the immediate necessity of the case, and I am speaking of the requirements of a bill which underwent several amendments, and which I have not seen in its completed form as it received the final assent of the Legislature, so that probably I shall find it more workable than I at first thought it was. Gentlemen, with these remarks I will move "That the report and accounts be received, approved, and entered upon the minutes." I shall be happy to hear any remarks you may have to offer, and to give any explanations which may be desired.

Mr. RHODES seconded the motion.

Mr. BECK: Does the £24,591 for coals used include the charge for labour and putting them into the warehouses?

The CHAIRMAN: It includes every expense up to the retort's mouth.

Mr. RHODES: What is the amount of reserve invested in?

The CHAIRMAN: Various things—some railway debentures and bonds.

Mr. R. A. GRAY: Gentlemen, you have seen the report and accounts for the past half year. With the knowledge and experience I have of gas matters generally, I think I am justified in saying that there is everything in these accounts to gratify the most sanguine expectations of the proprietors. It appears to me that there has been a continuance of that zeal, attention, and care for the interests of the proprietors generally that we have had occasion at former meetings to express our entire satisfaction with. With regard to the meter bill, to which my worthy friend the chairman has alluded, I fear his remarks may have produced the impression that you will have to remove all your meters in one year. The Act of Parliament requires that you should not put up any new meter unless it has been tested by the person who is to be appointed for the purpose, but the old meters may remain in existence for ten years from the passing of the bill. It would have been a serious thing indeed for all gas companies if, after having paid so much for meters as they have done, they were called upon at once to replace those meters. In such a case the loss would have been enormous; but to guard against that, there is provision made in Lord Redesdale's Bill for the continuance of the old meters in use for ten years, and there is the restriction to which I have referred respecting all new ones. I thought it necessary to make this explanation, because it is a matter of some importance to gas companies generally. It must be very gratifying to the proprietors to see how much the waste in this company has been reduced. I should say that the waste of gas, as far as this company is concerned, is almost less than in any other in the metropolis. I believe that, to a very great extent, this is owing to the alteration which has been made in the capacity of your mains. It must be obvious to every one that in a small main the amount of pressure is so great that the joints are apt to get loose, whereas in larger mains the effect of the pressure is not felt. I beg to say that I am highly gratified with the state of the accounts, and I have much pleasure in supporting the motion for their adoption.

Mr. STEWARD: Do you charge for meters?

The CHAIRMAN: No.

A DIRECTOR: Nor for services.

Mr. STEWARD: It is well I think the fact should be known, that in the Imperial Company they do charge for meters, so that our consumers really get their gas cheaper.

Mr. JOSEPH BOX said he differed from the chairman as to the amount of waste. He had invariably assumed as his standard 9500 feet of gas per ton of coals, and taking that yield upon the past half year, the waste was 12¾ per cent. instead of 8¾. Upon an analysis of the accounts he found there was an increase of rental equal to 13 and 1-7th per cent. upon every 100 tons of coal consumed at the Bankside and Greenwich stations, and the gross amount of saving (taking 9500 feet per ton as the standard) was £3300 as compared with the consumption of coals in the corresponding period of last year. The working of the Greenwich station showed an increase of 19½ per cent., and the total amount of increase was £1242. There were 1173 tons of coals less used at the Bankside and Vauxhall stations, and 511 tons less at Greenwich. The per centage of expenditure upon revenue was less by 1½ per cent., which, to his mind, was very satisfactory; for though wages had increased, and the directors had paid more for coals, that was no proof that the half year's working had been a bad one. He believed that in the working and manufacturing department there had been considerable care and attention paid by the engineer and those under him.

Mr. STEWARD inquired how the difficulty with the workmen had been got over?

The CHAIRMAN said he was happy to state that the men at their works had behaved remarkably well. The directors had had an application from them, not so much for an increase of wages, but more as a request, that if the gas companies in London increased the wages of their workmen generally, they would follow the same course, and do as others did. They did not hesitate for a moment to say that they would give as good wages as any other persons in the same business, and with that assurance the men were perfectly contented.

The motion was then unanimously adopted.

Mr. GIBBS (deputy-chairman) said it fell to his lot, as usual, to propose the dividend for the half year, and in doing so he should make but few observations, seeing that the chairman and Mr. Box had so thoroughly ventilated the report and accounts. The proprietors would see that the rental for the half year differed only from the preceding one by a few hundred pounds—a circumstance hardly worth mentioning in a rental of upwards of £59,000. But the directors had been necessitated, for the purpose of equalizing the dividend, to dip into the reserve-fund to the extent of £565, so as to enable them to pay the same dividend and bonus that they did last year. But when he informed the meeting that during the last five years the undivided balance had been augmented from £9000 to upwards of £13,000, he did not think they would blame the board for appropriating the small amount he had just named. Indeed, he thought the directors would have failed in their duty if, because of the small deficiency in the gains this half year, they had come forward and made a proposal to alter the dividend. He hoped and believed the affairs of the company were in a state of satisfactory progress. The alterations which their engineer had made in some of the mains, in one of the most important parts of the district, would he considered so much increase their profits as to enable the board at the meeting in February next to propose even a larger dividend. That very important district, the Blackfriars Road, had been entirely uprooted; the old mains, many of them utterly worthless, had been taken up and new ones put down on both sides of the way; so that in that district alone he was convinced their rental would be much increased. With these remarks, he moved—"That a dividend for the half year ending Midsummer last, at the rate of 7 per cent. per annum, together with a bonus of 10s. per cent. on the capital of the company, free of income-tax, be now declared, and that the dividend, with the bonus, be forwarded to the shareholders as usual; that the same be payable immediately after this meeting, and at the offices of the company, from Thursday, the 18th, to Monday, the 22nd inst., between the hours of twelve and three, and from that time on Wednesdays only, from two to four o'clock."

Mr. BENTLEY seconded the motion, expressing his entire satisfaction with the report and accounts which had been presented.

The motion was unanimously adopted.

The CHAIRMAN: We have on this occasion to express our deep regret at the death of our esteemed colleague, Mr. Edwards. A more gentlemanly man was scarcely ever associated with others, and a better man of business it was almost impossible to meet with. His services were of great value to the company, and were duly appreciated by the directors. They regret his removal, and they feel that not they alone but the company at large have sustained a loss by his decease.

The meeting was then made special, for the purpose of filling up the vacancy at the board caused by the death of Mr. Edwards.

The SECRETARY read letters from Mr. Joseph Box and Mr. Ambrose Boyson, announcing themselves as candidates for the vacant seat.

Mr. BOX begged to withdraw his name, feeling satisfied that though, as on a former occasion, he might be elected by a show of hands, he should be defeated afterwards on the ballot.

Mr. STEWARD thought Mr. Box had acted in a very handsome manner in withdrawing. He (Mr. Steward) would have voted against him had he gone to the ballot, because he should have regretted to see him resign his post as auditor of the company.

Mr. BENTLEY, in highly complimentary terms, proposed that Ambrose Boyson, Esq., be elected to the vacant seat at the board.

Mr. GRAY seconded the motion, which was cordially adopted.

The CHAIRMAN congratulated the meeting on the choice they had made, feeling confident, from a long acquaintance with Mr. Boyson, that his thorough business habits, and his knowledge of the world and of mankind, would be of essential service to the company.

Mr. BOYSON returned thanks for the honour conferred upon him.

Mr. GRAY proposed, and Mr. BENTLEY seconded, a vote of thanks to the chairman and board of directors, which having been unanimously agreed to,

The CHAIRMAN said: Gentlemen, on behalf of myself and colleagues, allow me to thank you sincerely for this mark of your confidence and consideration. No exertion shall be wanting on our part to deserve a continuance of it.

COUNTY AND GENERAL GAS CONSUMERS' COMPANY (LIMITED).

The Fourth Ordinary General Meeting of the Shareholders of the County and General Gas Consumers' Company was held on Monday the 15th of August, at their Offices, 76, King William Street, City—EDWARD H. J. CRAUFURD, Esq., M.P., in the chair.

The SECRETARY (Mr. R. S. Parker) read the report of the directors for the past half year, which, after congratulating the shareholders on the continued prosperity of the company, stated that, having carried out all their extensions and repairs, they were in possession of an immovable plant, worth £16,000. The number of shares on their register was 1180, on which there had been £3 per share called up, and the whole of it had been paid with the exception of £12. They had received £905 from sundry shareholders in anticipation of future calls, at a guaranteed interest of 5 per cent. per annum. The remaining portion of the capital had been raised by loans, of which the larger proportion was from shareholders. The property of the company was ample security for the capital so raised, and the profits were fully sufficient to pay 5 per cent. interest. It was, therefore, evident that, at any time they chose to convert that capital into share capital, they would be able to pay a dividend equal to that amount; and, as they were anxious to do so, they appealed to the shareholders to take up the remaining shares. The directors, in conclusion, called attention to the profit and loss account, which showed, after paying the working expenses of the company, interest on borrowed capital, &c., there would remain a net profit of £120. 15s. 7d. After paying a dividend, at the rate of 5 per cent. per annum, on the paid-up capital, there would remain a balance of £39. 1s. 4d. to be carried to the profit of the current half year.

Mr. WILLIAMS moved that the report and accounts be received, adopted, and printed.

Mr. H. P. STEPHENSON seconded the motion, and said he considered it necessary that, for the success of the company, the directors should receive some remuneration for their services, and also that the present directors should receive some remuneration for their past services. He likewise thought the qualification for a director should be altered from one to seventy-five shares. One share was not sufficient stake for a director to hold in the company and give confidence to the public. They had had £14,000 of borrowed capital in the company, and only £5000 paid-up share capital, and that acted very prejudicially to their interests out of doors. He thought it very desirable that borrowed capital should be converted into share capital as soon as possible, for there were many who would join them, but they did not like to see so large an amount of borrowed and so small an amount of share capital.

Mr. CHRISTIE said, although one share would qualify a person for a director, there was not one at that board who had less than fifty shares, and some a great many more. He, however, entirely concurred in Mr. Stephenson's remarks, and if he brought forward a motion in accordance with them at a future meeting, he would second him.

The CHAIRMAN thanked the shareholders for approving of their balance-sheet and the report, and remarked that the large loan capital they were working upon proved that it was very immaterial to them whether they had share or loan capital, for it would be just as easy to pay 5 per cent. in the shape of dividend as in the shape of interest. Besides, the public must have confidence in them, or they would not trust them with so large an amount of money. Their property was ample to secure it, as it had increased considerably during the past six months, without augmenting the loan capital. Last half year its value was a little over £11,000, and now it was nearly £16,000, while the other assets of the company brought the amount up to £19,097. 5s. 6d. He then drew the attention of the meeting to the fact that this half year the profits had been more than double those of the previous half year, and there was every prospect of progressive improvement.

The motion was then unanimously agreed to. A dividend at the rate of 5 per cent. per annum for the half year was declared, and a vote of thanks to the chairman and directors closed the proceedings.

LIST OF NORTH AMERICAN GAS COMPANIES.

UNITED STATES.

Organized.	Town.	State.	Capital.	Dols. each Share.	Semi-Ann. Div.	Price per Cent.	Population of Gas District.	Private Consumers.	Public Lamps.	Price per 1,000 feet.	REMARKS.
1857	Adrian	Mich.	50,000	50		84	3,500	230	20	3 50	Earnings applied to extension.
1857	Akron	O.	10,000				3,500	120	22	3 00	
1845	Albany	N. Y.	250,000	20	4	105	65,000	3,200	510	3 00	
1858	Albion	N. Y.	30,000	100		90	3,000	116		3 80	
1851	Alexandria	Va.	106,000				9,000	780	105	3 50	
	Alleghany	Pa.	140,000	25	4	104	25,000				
1853	Allentown	Pa.	40,000	100	3½	100	4,500	300	30	3 50	
1857	Alton	Ill.	75,000				4,000	250	67	3 50	Geo. T. Brown, Owner.
1858	Annapolis	Md.	24,000	25		95	4,000	109	70	4 00	A. Randall, Pres.
1858	Ann Arbor	Mich.	23,000	50	5	95	5,500	180	25	4 00	Commenced lighting Sept., 1858.
	Astoria	N. Y.									
1855	Atlantic	Geo.	50,000	25	5		12,000	200	81	5 00	
1855	Attleboro'	Mass.	50,000	100	3	75	6,000	151		4 00	Henry Rice, Clerk and Supt.
1850	Auburn	N. Y.	60,000	50	5	100	12,000	400	120	7 00	Rosin gas.
	Augusta	Geo.									
1853	Augusta	Me.	86,000	50		50	10,000	235		4 00	
1816	Baltimore	Md.	550,000	100		135	180,000	8,200	1800	2 50	Columbus O'Donnell, Pres. Length of mains 65 miles.
1852	Bangor	Me.	120,000	100	5	104	17,000	764	30	3 50	
	Batavia	N. Y.			4						
1853	Bath	Me.	68,000	100			10,000	230	18	3 75	
1858	Belfast	Me.	13,000	100			7,000	133		7 00	Rosin gas. W. H. Burrill, Supt.
1856	Bellefont	Pa.	20,000	25			3,500	105	18	4 00	Edmund Blanchard, Pres.
1854	Bethlehem	Pa.	23,000	50	2	100	2,000	207	29	3 80	
1853	Binghampton	N. Y.	50,000	50	3½		10,000	230	53	4 00	
1853	Bordentown	N. J.	50,000	25			4,000	114	16	3 80	
1822	Boston	Mass.	1,000,000	500	5	140	200,000	10,410	2265	2 50	
1851	Bridgeport	Ct.	75,000	25	5	100	10,000	500	58	4 00	
1857	Bridgeton	N. J.	22,000	00	4		3,000	169	13	4 00	U. D. Woodruff, Pres.
1855	Bristol	R. I.	35,000	25		70	6,000	120	24	4 00	
1825	Brooklyn	N. Y.	2,000,000	20	4	130	150,000	10,000	2600	3 00	
1848	Buffalo	N. Y.	600,000	50	5	115	70,000	3,300	2000	3 00	
1853	Burlington	Vt.	75,000	25	5		10,000	220		4 50	
1852	Cambridge	Mass.	200,000	100		106	20,000	1,294	257	3 50	Extra div. 5 per cent., April 15, 1859.
1852	Camden	N. J.	100,000	100	4	100	10,500	700	140	3 50	O. W. Goodwin, Supt.
1853	Canandaigua	N. Y.	50,000	50	3	90	7,000	190	21	4 00	
1853	Cape Island	N. J.	80,000	100			10,000	80	20	6 00	Bathing Station. Works run 2½ months in the year.
1858	Cattskill	N. Y.	10,000		3		3,000	134	20	4 00	Owned by G. T. Sutton, Peckskill.
1846	Charleston	S. C.	723,800	25		112				4 00	
1851	Charlestown	Mass.	150,000	50	4	120	25,000	1,150	210	3 50	Light Somerville also. Pop. 7000.
1858	Charlotte	N. C.	14,000	50	4	110	3,500	120	50	7 00	Rosin gas.
1849	Chicago	Ill.	750,000	25	6	105		4,100	970	2 50	New contract with City Council for twelve years.
1851	Chillicothe	O.	40,000	25	5	100	12,000	290	33	3 50	J. W. Graham, Sec.
1841	Cincinnati	O.	1,000,000	100	4	115	200,000	6,000	1700	2 50	
1854	Cohoes	N. Y.	50,000	20	5		5,000			3 60	
	Colchester	Ct.			3½						
1853	Columbia	Pa.	37,500	25		70	5,000	250	21	3 50	
1852	Columbia	S. C.	44,000	25			6,000	400	55	6 00	Rosin gas. G. E. Walker, Pres.
1853	Columbus	Ga.	54,175	25	5	95	8,000	246	77	7 00	Rosin gas. Two years' stock of rosin.
1850	Columbus	O.	100,000	10	5	120	30,000	800	174	3 00	
1853	Concord	N. H.	45,000	50	4	112½	10,000	400	38	3 50	
1854	Cumberland	Md.	60,000	50	3		6,000	230	36	4 00	
1857	Danbury	Ct.	15,000	25	4	100	7,000	118		4 00	
	Davenport	Iowa.									
1848	Dayton	O.	50,000	25	4	90	25,000	575	165	4 00	
1853	Dedham	Mass.	40,000	50			6,000	112		4 00	Henry W. Richards, Treas.
1849	Detroit	Mich.	250,000	50	5	100	30,000	1,417	491	3 50	
1857	Dorchester	Mass.	110,000	100		50	12,000	210	50	4 00	
1859	Dover	Del.	25,000				2,000				
	Dubuque	Iowa.									
1853	East Boston	Mass.	133,000	25	4	102½		475	270	3 50	George H. Plummer, Treas.
1858	East Greenwich	R. I.	11,200	100	15	100	3,000	100		7 00	Rosin gas. Works not extended to the town.
1850	Easton	Pa.,	125,000	50	4	120	6,000	657	76	3 60	Capital in use, 108,850 dollars.
1856	Eastport	Me.	31,669	55			5,000	135	15	4 00	
1855	Elizabeth	N. J.	100,000	20	3½	95	3,500	230	40	3 80	Capital in use, 59,000 dollars.
1852	Elmira	N. Y.	50,000	25	3½	70	10,000			4 00	
1852	Erie	Pa.	68,000	50	3½		10,000	300	80	3 00	
1847	Fall River	Mass.	26,000				12,000	400	60	3 50	Owned by a manufacturing company.
1859	Fayetteville	N. C.	25,000	100	6	100	7,000			6 00	Rosin gas.
1857	Fishkill	N. Y.	12,000	25			1,000	50		6 00	
1853	Fitchburg	Mass.	45,000	50	3	60	7,000	180	34	4 00	H. F. Coggeshall, Supt.
1855	Flushing	N. Y.	41,000	50	1½		6,500	134	18	4 00	
1851	Frankfort	Ky.	30,000				5,000	140	79	4 50	Works owned by City. Average gross receipts, 7500 dollars.
	Fredericksburg	Va.	75,000	50	5	40					
1851	Frederick City	Md.	35,000	100			5,500	300	40	6 70	Rosin gas.
1858	Fredonia	N. Y.	10,000	50			2,000	37	8	4 00	Natural gas, issuing from a rock.
1855	Galena	Ill.	80,000	50			8,000	236	60	4 00	
1858	Galveston	Texas	12,000	50			7,000	150		6 00	
1854	Geneva	N. Y.	75,000	25	3½		6,000		34	4 00	
1854	Glenn's Falls	N. Y.	35,000	50	3	80	4,000	161	18	4 00	
1854	Gloucester	Mass.	40,000	50						3 50	
1855	Great Barrington	Mass.	5,000	100			4,000	58	4	7 00	Rosin gas.
1854	Hagerstown	Md.	15,000	10				125		7 50	Changing from oil gas to coal.
	Hallowell	Me.									
1857	Harlem (N.Y. City)	N. Y.	300,000	50	3½	105	25,000	700	1800	3 50	District north of 79th Street.
1849	Hartford	Ct.	175,000	25	4	105	25,000			3 50	
1856	Hollidaysburg	Pa.	30,000	25	3	80	4,000	200	10	3 50	J. A. Landis, Pres.
1854	Honesdale	Pa.	30,000	25	3	80	3,500	180	35	4 00	
1853	Hudson	N. Y.	50,000	100	3½	100		260	64	4 00	Oliver Bronson, Pres.
1857	Huntingdon	Pa.	13,000	50	3		2,000	105	15	3 50	
1856	Huntsville	Ala.	7,325	25			2,000		100	5 00	
1857	Iowa City	Iowa	40,000	50			4,000				
1852	Ithica	N. Y.	75,000	25	3½	67½	6,000	212	26	4 00	
1857	Jackson	Mich.	25,000	50		70	6,000	125	20	3 50	Earnings applied to improvements.
	Jacksonville	Ill.									
1856	Jamaica	N. Y.	20,000	25	4	90	6,000	130	20	4 00	J. G. Lamberson, Sec.
1856	Janesville	Wis.	50,000	100			12,000	200	30	4 00	Mortgage debt, 20,000 dollars.
1853	Jersey City & Hoboken	N. J.	300,000	20	5	120	30,000	1,900	212	3 00	
1856	Johnstown	Pa.	40,000	25		50	10,000	251		3 00	S. H. Smith, Treas.
1858	Kalamazoo	Mich.	30,000	100			10,000			4 00	New company; no results.
1844	Kensington	Pa.	100,000	10	5	110	60,000	2,800	400	2 50	
1855	Keokirk	Iowa	100,000	100			10,000	360	120	3 50	Capital in use, 50,500 dollars. Mortgage debt, 61,000 dols.
1855	Kingston	Pa.	50,000	50			3,000	240	30	4 00	
1854	Knoxville	Tenn.	63,000	50			4,000	128	40	5 00	
1854	Lafayette	Ind.	60,000	50	3		8,000	250	60	3 25	Charles Collins, Supt.
1849	Lancaster	Pa.	100,000	25	4	80	15,000	610	100	3 00	Capital in use, 74,000 dollars.
	Lansingburg	N. Y.	25,000				7,000			4 00	G. H. Norman, Owner.
1849	Lawrence	Mass.	120,000	100	5		15,000	745	63	3 50	
	Lewiston	Me.	100,000	50	4	100	10,000	300	104	4 00	
1856	Lewistown	Pa.	19,800	100	3		7,000			4 00	
1853	Lexington	Ky.	60,000	20	3	80	3,000	150	18	3 60	J. W. Shaw, Sec.
1838	Louisville	Ky.	481,400	50	6	125	50,000	2,839	938	2 70	Robt. G. Courtenay, Pres.
1849	Lowell	Mass.	200,000	100	5	120	50,000	2,290	220	3 25	
1853	Lynchburg	Va.	70,000	25	5	104	8,000	320	50	3 80	
1852	Lynn	Mass.	55,000	100	4	100	20,000	400		4 00	
1859	Lyons	N. Y.									Company now organizing.
1852	Macon	Geo.	75,000	25	4	112	5,000	254	105	5 00	Gas made of pine wood.
1851	Madison	Ind.	60,000	25	3	70	10,000	303	95	3 50	A. Todd, Pres.
1855	Madison	Wis.	100,000	25			5,000	220	70	6 00	
1854	Malden & Melrose	Mass.	50,600	100	3	100	5,000	180	25	4 00	

LIST OF NORTH AMERICAN GAS COMPANIES.

UNITED STATES—*Continued.*

Organized.	Town.	State.	Capital.	Dols. each Share.	Semi-Ann. Div.	Price per Cent.	Population of Gas District.	Private Consumers.	Public Lamps.	Price per 1,000 feet.	REMARKS.
1852	Manchester	N. H.	100,000	100	5	110	25,000	800	125	3 00	J. T. P. Hunt, Agent.
1830	Manhattan (N.Y. City)	N. Y.	4,000,000	50	5	150	600,000	25,000	8576	2 50	Capital in use, 3,000,000 dollars.
1857	Marietta	O.	30,000	50			6,000	125	7	4 00	
	Massilon	O.									
1855	Meadville	Pa.	36,000	25			3,000	150	90	3 50	
	Memphis	Tenn.									
1852	Middletown	Ct.	50,000	25	3		10,000	250	30	4 00	
1852	Milwaukie	Wis.	400,000	50	5	105	24,000	1,450	205	3 50	Capital in use, 242,000 dollars.
1836	Mobile	Ala.	200,000				30,000		850	4 50	
	Montgomery	Ala.	100,000	100			7,000		280	6 00	
	Morrisania	N. Y.									Company now organizing.
	Morriston	N. J.									Company just organized.
1855	Mount Holly	N. J.	16,650	50	3		2,000	140		7 00	Rosin gas.
1857	Muscatine	Iowa	50,000	25							
1845	Nantucket	Mass.	36,000	100	4	95	10,000	270	65	4 00	Geo. W. Macy, Pres.
	Nashua	N. H.	45,000	60		85	10,000	250	46	3 50	
1850	Nashville	Tenn.	140,000	50	6	110	11,000	700	200	4 00	
	Natchez	Miss.									
1846	Newark	N. J.	300,000	50	4½	110	45,000	2,400	453	3 50	
1856	Newark	O.	30,000	100			7,000	135	30	3 50	
1852	New Albany	Ind.	50,000	50	3½		16,000	250	73	3 50	
1852	New Bedford	Mass.	130,000	100	5		15,000	1,125	304	3 25	
1852	New Brunswick	N. J.	100,000	20	4	115	15,000	460	75	3 80	Capital in use, 53,800 dollars.
1852	Newburg	N. Y.	667,000	20	3½	90	15,000	600	55	4 00	
1857	Newcastle	Del.	22,300	10	3	95	1,200	112	19	4 00	Thos. T. Tasker, Pres.
1848	New Haven	Ct.	200,000	25	4	130	30,000	2,004	201	4 00	
1853	New London	Ct.	70,000	50	3	100	12,000	300	12	4 00	J. N. Harris, Sec. and Treas.
1835	New Orleans	La.	1,500,000	100	6	154	120,000	5,000	2000	4 50	
1854	Newton & Watertown	Mass.	87,900	100	2½	60	10,000	265	51	4 00	
1853	Newport	R. I.	130,200	100	4	105	10,000	500	96	3 50	Henry Bull, Pres.
1823	New York	N. Y.	1,000,000	50	5	170	100,000	13,000	3150	2 50	
1853	Norristown	Pa.	41,700	25	3	105		350	50	3 75	
	Northern Liberties	Pa.	400,000	25	7½	140				2 50	
1856	Northampton	Mass.	35,000	25			4,500	140	30	4 00	
1859	Norwalk	O.	150,000	100			4,000	100	26	4 00	
1857	Norwalk	Ct.	26,670	25	4	105	6,000	205	8	4 00	Isaac S. Burr, Treas.
1855	Norwich	Ct.	75,000	25	4	100	12,000	500	100	3 50	S. Dunham, Pres.
1852	Oswego	N. Y.	81,250	25	3½	85	15,000			3 80	
1855	Ottawa	Ill.	45,000	25	6½	100		222	71	4 00	W. W. Cushman, Pres.
1856	Owego	N. Y.	40,000	50	3½		10,000	180	36	4 00	
1845	Painsville	O.	200,000	100	5						
1857	Palmyra	N. Y.	12,000	50			4,000	120		3 50	
	Paterson	N. J.	110,000	5	3	95	13,000	600	96	4 50	
1850	Pawtucket	R. I.	65,000	50	4	106		475	75	3 50	
1855	Peekskill	N. Y.	31,000	50	3		4,000	190	37	4 00	G. T. Sutton, Lessee.
1855	Peoria	Ill.	90,000	50			8,000	340	140	3 50	
1852	Petersburg	Va.	120,000	25	5	100	20,000	560	192	3 80	Jas. N. Nichols, Pres.
1841	Philadelphia	Pa.	3,000,000				650,000	32,000	5000	2 25	Revenue, 1,100,000 dollars. Length of mains 255 miles.
1855	Piqua	O.	50,000	50		95	5,000	175	51	4 00	
1836	Pittsburg	Pa.	300,000	50	5	140	53,000	2,500	516	1 50	James M. Christy, Treas.
1854	Pittsfield	Mass.	40,000	100		60	6,000	210		4 00	
1853	Plymouth	Mass.	40,000	100			8,000	181	5	4 00	
1849	Portland	Me.	250,000	50	4	110	30,000	1,900	242	3 50	For public lamps, 3 00 dollars per 1000 feet.
1851	Portsmouth	N. H.	60,000	100	3	90	12,000	425	31	4 00	John Trundy, Agent.
1855	Portsmouth	O.	50,000	50	4	100	6,000	350	63	3 50	
1855	Portsmouth	Va.	80,000	50	4	100	7,000	236	58	4 00	
1850	Pottsville	Pa.	104,500	50	2	50	8,500	520	62	3 30	Changed from rosin to coal, 1856.
1850	Poughkeepsie	N. Y.	70,000	25	4	85	15,000	625	64	4 00	S. B. Johnston, Treas.
1848	Providence	R. I.	525,000	50	4	112½	50,000	4,000	820	3 00	
1854	Quincy	Ill.	89,650	50	4	90	18,000	398	217	3 50	
1855	Racine	Wis.	40,350	25			7,000	200	33	3 50	
1857	Rahway	N. J.	35,000	20		100	5,000	150		4 00	
1858	Raleigh	N. C.	18,000	100	6	110	5,000	108	34	6 00	Rosin gas.
1848	Reading	Pa.	80,000	25	3	75	20,000	700	40	3 00	
1852	Richmond	Va.	341,975				30,000				
1848	Rochester	N. Y.	200,000	50	5	115	40,000	2,000	430	3 00	L. A. Ward, Sec. and Treas.
1854	Rockland	Me.	50,000	100		60	6,000	170	150	4 40	
1852	Rome	N. Y.	35,000	100	3½				20	3 60	
1854	Rondout & Kingston	N. Y.	65,000	20	3½	100	3,000	375	36	4 00	
1854	Roxbury	Mass.	150,000	100	5	110	20,000	1,100	360	3 50	
	Saco	Me.	71,600	100	3½			220	18	4 00	
	Saint Joseph	Mo.									
1847	Saint Louis	Mo.	600,000	50			90,000	4,000	1550	3 50	
1857	Saint Paul	Min.	200,000	50	3	75	10,000	139	154	6 00	
1856	Salem	N. J.	30,000	20	3		5,000	260	26	3 80	
1850	Salem	Mass.	125,000	100	4	110	22,500	1,300	150	3 50	12 miles street mains.
1859	Salisbury	N. C.	14,000	50	6	100	3,500	70	50	6 00	Rosin gas.
1854	Sandusky	O.	75,000	50			9,000	300	70	3 93	
1853	Saratoga	N. Y.	75,000	100			6,000	250	20	3 60	C. E. Durkee, Supt.
1851	Schenectady	N. Y.	50,000				11,000	400	160	4 00	Smith and Craige, Proprietors.
1857	Scranton	Pa.	100,000	25		75	4,000	120		3 80	
1857	Selma	Ala.	20,000	100			2,000	40	18	5 00	
1856	Seneca Falls	N. Y.	80,000	50	2	60	6,000	220	37	4 00	M. L. Bellows, Supt.
	Shreveport	La.									
1855	Stamford	Ct.	22,000	25	5	110	7,000	140	55	4 00	
1854	Springfield	Mass.	75,000	50			7,000	375	100	3 25	
1857	Staten Island	N. Y.	150,000	50	5	100	26,000	200		4 00	
1859	Staunton	Va.	18,000	50	6	100	4,000	70		7 00	Rosin Gas.
1848	Syracuse	N. Y.	125,000	25	5	100	25,000	1,200	200	3 30	
1859	Tarrytown	N. Y.	70,000	50			5,000			4 00	
1853	Taunton	Mass.	60,000	50	3	100	12,000	245	44	4 00	
	Terre Haute	Ind.									
1853	Toledo	O.	100,000	50	3	70	9,000	450	65	3 50	
1847	Trenton	N. J.	100,000	20	4	100	15,000	700	95	3 80	
1848	Troy	N. Y.	200,000	100	4	110	35,000	1,575	312	3 60	
1849	Utica	N. Y.	80,000	100	4	100	22,000	612	112	3 60	H. H. Fish, Sec. and Treas.
1854	Vicksburg	Miss.	66,000	50			4,000	220	115	4 50	W. H. Shaw, Sec.
1858	Washington	D. C.	500,000	20	5	120	50,000	2,500	800	3 50	Congress is equal to probably 2,500 more.
1854	Waterbury	Ct.	100,000	25			6,000	200	36	4 00	C. B. Merriman, Pres.
1852	Waterford	N. Y.	12,000				4,000	80			W. T. Seymour, Sec.
1852	Watertown	N. Y.	20,000	25				260	36	7 60	
	Watutna	Wis.									
1852	Westchester	Pa.	50,000	25	2½		3,000	543	64	3 50	
1853	West Troy	N. Y.	100,000	50	5	80	8,000	425		4 00	
1850	Wheeling	Va.	75,000	25	6	103	13,000	700	129	2 70	
1850	Williamsburg	N. Y.	337,500	50		75	60,000	1,700	681	3 50	
1857	Williamsport	Pa.	31,000	25			6,500	253		3 80	Capital in use, 24,575 dollars.
1856	Wilkesbarre	Pa.	50,000	25			4,000	450		3 80	
1853	Wilmington	N. C.	60,000	50	5	102½	8,000	286	62	5 00	Rosin gas.
1852	Wilmington	Del.	130,000	50	5	132	15,000	1,250	130	3 50	
1854	Winchester	Va.	36,000	50	2½	75	5,000	195	40	4 00	
1856	Woodstock	Vt.	7,950	50	4	70	4,000	79	1	6 00	Rosin gas.
1853	Woonsocket	R. I.	82,600	100	5	75	4,000	200		3 50	R. G. Randall, Treas.
1849	Worcester	Mass.	120,000	100	5	90	25,000	920	127	3 50	
1854	Yonkers	N. Y.	70,000	50			6,500	200		3 80	
1849	York	Pa.	40,000	50	3	90	9,000	314	37	7 00	Changed from coal to rosin. Alex. Small, Pres.
1858	Ypsilanti	Mich.	20,000	50			6,000	140	20	4 00	Earnings for 1859 used in extending mains.
1848	Zanesville	O.	44,600	25	4		10,000	318	73	3 50	Thos. Halpin, Sec.

LIST OF NORTH AMERICAN GAS COMPANIES.

CANADA.

Organized.	Town.	State.	Capital.	Dols. each Share.	Semi-Ann. Div.	Price per Cent.	Population of Gas District.	Private Consumers.	Public Lamps.	Price per 1,000 feet.	REMARKS.
1848	Kingston	C. W.	20,000	100	5	105	12,000	400	106	3 50	John Kerr, Manager.
1853	London	C. W.	100,000	20	5	100	12,000	300	112	5 00	
1847	Montreal	C. E.	300,000	40	4	108	80,000	2,000	500	3 25	
1854	Ottawa	C. W.	40,000	20		87½		284	50	4 00	
	Quebec	C. E.	180,000	200	4	116		1,217	365	3 00	
1847	Toronto	C. W.	400,000	100	4	99	50,000	1,919	874	3 33⅓	

CUBA.

1844	Havanna	Cuba	125,000	500	7½	155			1715	5 00	

BALANCE-SHEET OF THE WORKSOP GAS COMPANY,

FOR THE YEAR ENDING JUNE 1, 1859.

Dr. RECEIPTS.		*Cr.* EXPENDITURE.	
Balance	£ 682 14 6	Paid one year's dividend, due June 1, 1858	£ 437 10 0
To cash received for 2,048,000 feet of gas, at 5s., due Dec. 1, 1858	512 0 0	Ditto interest on loans and advances	217 8 10
Ditto for lights by contract	8 10 0	Cost of arbitration on the price of public lamps	32 7 6
Amount due for 2,615,500 feet of gas, at 5s., on June 1, 1859	653 17 6	Ditto of sinking a well	8 19 5
Ditto for lights by contract	9 10 0	By cash paid for coal	£ 379 0 5
Cash received from the Local Board of Health, for lighting 103 public lamps for one season	288 8 0	Ditto for furnace coal	36 15 0
Coke account	299 0 0	Ditto for lime	34 2 0
Account for tar, lime, &c.	68 9 10	Ditto for repairs at works and mains	26 4 8
		Ditto for wages	112 16 5
		Ditto for retorts and setting	28 18 0
		Ditto for rates and taxes	61 16 5
		Ditto for new services	41 3 0
		Ditto for cost of public lamps	68 16 1
		Ditto for leading coke	16 6 4
		Ditto for salaries	77 15 4
		Ditto for printing and stationery	7 6 3
		Ditto for sundry payments	10 17 6
		Ditto for arrears and overcharges	6 13 9
			908 11 2
		Dividend at 5 per cent.	£ 450 0 0
		Surplus last year	245 14 6
		Ditto this year	221 18 5
			£ 917 12 11
		Balance	917 12 11
	£2,522 9 10		£2,522 9 10

Quantity of gas made at the works during the year ended June 1, 1859			6,712,200 cubic feet.
Of the above there has been consumed by meter	4,671,500 cubic feet, or	69·3 per cent.	Of the quantity made.
Ditto by public lamps	1,081,500 ,, ,,	16·0 ,,	
Ditto by contract burners	200,000 ,, ,,	3·4 ,,	
Loss by leakage	759,000 ,, ,,	11·3 ,,	
	6,712,000 cubic feet.	100	

METROPOLITAN BOARD OF WORKS.

REPORT ON THE RELATIVE MERITS OF THE DESIGNS AND TENDERS FOR THE PUMPING ENGINES AND MACHINERY FOR RAISING THE SEWERAGE AT THE DEPTFORD STATION, AS APPLICABLE TO THE WORKS TO BE CARRIED OUT.

1. After several consultations and a careful examination of the various competing plans for raising the sewerage of the south side of the Thames at the Deptford station, we have agreed to the following report.

2. Before, however, entering upon the question more immediately submitted to us, with respect to the relative merits of the different schemes, we desire to observe that a bare expression of our opinion of those schemes would probably be as unsatisfactory to you as to ourselves, and that we have therefore submitted a general description of the engines and pumping arrangements we recommend for your adoption.

3. For facility of reference in the consideration of the various competing plans, we have in the subjoined table divided them into four classes:—

No. 1.	Common flash wheel	7 plans
No. 2.	Lifting wheels	3 ,,
No. 3.	Centrifugal and screw pumps	5 ,,
No. 4.	Ordinary pumps	15 ,,
	Total	30 plans

4. At an early stage of our proceedings we resolved, after due deliberation, to be governed in our determination rather by the suitability of the mechanical arrangements proposed by the several competitors than by the amount of the respective tenders; a course we felt warranted in adopting under the no doubt correct impression, that in a case of this kind mere monetary economy is but of secondary importance to the results to be obtained by the adoption of fit and adequate machinery.

5. We have rejected all designs comprised in classes 2 and 3, because we are decidedly of opinion that centrifugal pumps cannot be advantageously applied under the prescribed conditions, or to a constant lift of the given height, and because the effective discharge of Archimedean and other screws, in proportion to the power employed, is, in our opinion, unsatisfactory.

6. The lifting (bucket) wheels have not, so far as we are aware, been practically applied on a large scale, nor do we conceive that contrivances of this nature possess any advantages that would justify a decision in their favour.

7. As respects the flash wheels comprised in class No. 1, although we admit the simplicity of their construction and the advantages arising from the absence of valves, yet we think it right to observe, there is no existing instance of the use of flash wheels of the enormous magnitude suggested in some of the designs, and that we entertain grave doubts of their successful and economical action, either when working singly against so considerable a head as eighteen feet, or when working in duplicate against two successive heads of nine feet each. We regard the great weight of these machines, the indispensable employment of toothed gear, and the large amount of friction to be overcome, as serious objections; and we think also that the stench which would be occasioned by the constant and violent agitation of the sewerage by these wheels may be properly urged as an additional and valid reason against their adoption.

8. For these and other weighty considerations, we are of opinion that the most available plans are comprised under class 4—namely, those which suggest the introduction of various modifications of pumps. Of these there are fifteen examples, of which five indicate single-acting pumps, actuated by single-powered engines, and the remaining ten indicate single or double pumps, worked by rotative double-powered crank engines; and for the most part the engines are proposed to employ high-pressure steam, working expansively.

9. As regards the single-powered expansive engines, there is little doubt that their superiority in the economy of fuel has been well established in several water-works and in the Cornish mines. This, however, has, in great degree, been owing, not merely to the successful application in these engines of the expansive action of highly-pressed steam, but also to the fact of their having generally been made of large dimensions, and to their having been applied to high lifts and under circumstances expressly favourable to the development of their peculiar properties. We do not think the same advantages would result from their use with the very moderate head of eighteen feet, and under the other conditions required in the present instance; and we believe that a nearly equal economy of fuel, and a greater economy in other respects, will be secured by a judicious form of rotative engines, working with expanded steam of considerable tension.

10. On the whole, we decidedly prefer the double-powered engine to the single-powered engine, partly for the reasons already assigned, but also on account of the length of the stroke in the cylinder and pumps being permanently limited by the agency of the crank, thereby securing the machinery from those serious accidents which have so often occurred to single-powered engines from the staking or injury of valves, and from the neglect or inattention of careless or unskilful engine-men.

11. Of all the combinations of rotative engines and pumps, we give the preference to those in which the pumps are actuated directly from the engine-beams without the intervention of wheel-work shafts or cranks; and we are of opinion that the designs most nearly approaching the requirements of the board, and most easily admitting the necessary modifications hereafter mentioned, are those of Messrs. Dagleish, Harvey, Hawthorn, Rothwell, and Sandys and Vivian. As, however, originally presented, each of these designs expresses conditions either of conception or arrangement, which preclude our assigning to any one the merit of completely fulfilling the requirements of the case—for we are unanimously of opinion, that for the intended purpose the total power should include an extra allowance or reserve of one-fourth as a provision in case of stoppage by accident or other casualty, or for ordinary repairs, and should be divided amongst five identically similar rotative engines of 100-horse power each; that these engines should have a stroke not shorter than eight feet nor longer than ten feet; that the ordinary speed of the pistons should not exceed 200 feet per minute, and of the pumps 100 feet per minute; and that the latter, which ought to be attached in duplicate, should be of the kind called single-action "ram-pumps," and be operated upon directly from the beams of the engines.

12. Such engines may be advantageously constructed with single cylinders of 42 inches diameter and 9 feet stroke, working with double-beat valves and variable expansion, and with steam of a tension on the boiler of not more 25 lbs. above the pressure of the atmosphere. The two pumps may be hung equidistantly on each side of the beam centre, and may each have rams of 72 inches diameter and 4½ feet stroke; and they may be most advantageously placed at half the height to which the water is to be elevated, and the suction and delivery clacks (each to be subdivided into a number of small valves) being accessibly hung clear of the water, and at a slight inclination with the vertical, so as to offer little resistance to the action of the engine and the passage of the current. Each engine should be provided with two boilers of simple construction, about 6 feet diameter and 30 feet long, cylindrical in the shell, and fitted with cylindrical fire tubes of about three feet diameter.

The boilers should, therefore, not be fewer than ten in number, and should possess in the aggregate not less than 5000 feet of heating surface.

13. We also think that a proper apparatus should be applied to a well, separated by a grating from the pumps for raising the heavy and floating matters brought from the sewers, and we recommend that two small engines should be provided for this purpose, as proposed in several of the designs.

14. In conclusion, we beg to observe that the foregoing suggestions, brief as they are, will furnish sound and sufficient data for the preparation of the working drawings and specifications of the machinery and apparatus required by the board, and upon which more specific and uniform tenders may be based; and that, although we have not been able to recommend any one of the designs for adoption in its entirety, yet that many of them exhibit great talent and much careful thought and care in their preparation. To one of the designs of Mr. Dagleish we may particularly refer with high commendation.

We may add, that we shall learn with much satisfaction that our efforts have been successful in the solution of a novel, not to say somewhat difficult problem, and that they have facilitated the execution of the great undertaking of which their immediate subject forms a very important feature.

We have the honour to be, gentlemen, your most obedient servants,

ROB. STEPHENSON.
JOSHUA FIELD.
JOHN PENN.
T. HAWKSLEY.
GEO. P. BIDDER.
J. W. BAZALGETTE.

To the Metropolitan Board of Works.

CLASS 1.

Common Flash Wheels.

Name of Author.	Description of Engine.
Dagleish	Double-powered beam.
Hawthorn	,, ,,
Hick and Son	,, ,, two cylinders.
Kay	,, ,,
Rennie and Son	,, ,,
Rothwell and Co.	,, ,,

CLASS 2.

Lifting Wheels.

Harvey and Co.	Horizontal double powered.
Lawrie	Double-powered beam.
Williams and Co.	,, ,,

CLASS 3.

Centrifugal and Screw Machines.

Easton and Amos	Double powered.
Forrester	,, beam.
Harvey and Co.	,, horizontal
Samuelson and Co.	,, ,, high pressure.
William Simpson	,, two cylinders.

CLASS 4.

Pumps.

Dagleish	Single powered.
Easton and Amos	Direct ,, double cylinder.
Harvey and Co.	Single ,,
Hawthorn	Double ,, beam.
,,	,, ,, ,,
Rennie and Son	,, ,, ,,
Rothwell and Co.	,, ,, ,,
Sandys, Viv an, and Co.	Single ,,
,, ,,	Direct action.
Slaughter and Co.	Double horizontal, high pressure.
J. Watt and Co.	Double power, horizontal.
Williams and Co.	Single powered,
,, ,,	,, ,,

THE CHEAP GAS MOVEMENT IN GLASGOW.

A Meeting was held in the evening of Tuesday, Aug. 16, in the Baronial Hall, Portland Street, for the purpose of taking steps to get a reduction in the price of gas. Mr. ADAM PRINGLE occupied the chair, and the hall was filled almost to suffocation.

The CHAIRMAN, in introducing the lecturer, after alluding to the lecture of Mr. Flintoff delivered in the Trades' Hall last week, the object of which was to disseminate a knowledge of the subject in all its details, and to render popular a movement now begun, having for its object the overthrow of the monopoly in that acknowledged necessary of life—gas—(applause)—said it was not the desire of the agitators of this movement to encroach in the slightest degree upon the privileges or rights of shareholders in gas companies. (Hear.) The shareholders were entitled to a dividend of 10 per cent. and it was not grudged, nor was it attempted to deprive them of it. The Government, however, who had given them that power, made the consumers partners in the business. This relationship, which was ratified by a deed of partnership,—viz., the Act of Parliament,—was perfectly plain; and it was their determination to make the public aware of its existence, and so prevent, if possible, that wasteful expenditure on the part of gas companies, whether by antiquated means of production, or useless outlays of capital, and thereby retarding one of the most important clauses of the Act. In the year 1817 the Gaslight Company of Glasgow was established, they having received power from the Government to light the town of Glasgow proper, Anderston being the farthest point to which they could go. In 1825 they again went to Parliament, and got power to raise £40,000; in 1826 they raised £50,000, making in all the sum of £150,000, which, with £10,000 of borrowed money, made £160,000 capital. Previous to 1843 the gas consumers of Glasgow had many complaints to make, and a second company being formed, a competition was induced, the effect of which was a reduction of the price of gas from 8s. to 6s. 6d. By the clause in the Act of Parliament previously referred to, it was enacted, that when the shareholders obtained 10 per cent. on the invested capital, the rest of the profits should go towards the reduction of the price of gas. And how was this evaded? for it was evaded. In Liverpool the price at this moment was 3s. 9d. The sum of money which the company had in their works was £600,000, and with this 10 per cent. to divide on this sum they were able to light the town for 3s. 9d., while in Glasgow they had only to raise 10 per cent. on £300,000, and yet the price of gas was 5s. (Applause.) The mode taken by the companies when there was an appearance of surplus profit was to put in extra capital to absorb the interest. They have no occasion for more capital, unless by carrying mains and pipes into Yoker and places equi-distant. It was all the same to them where they put them if they got 10 per cent. for their money. (Applause.)

Mr. FLINTOFF then came forward and addressed the meeting at considerable length. He commenced by alluding to his having overturned 17 monopolies on the part of gas companies, remarking that it was with the view of adding another to the number, and saving to the breeches pockets of gas consumers of about 6s. in the pound, that he was present that evening. He then went into the theory of gas-making, observing in the outset that it was not so well known as it ought to be, although one of the simplest of the sciences. He next related the circumstances under which the two gas companies in Glasgow had been formed, and compared the prices charged by them with those of London, Liverpool, and Sheffield, showing that while in those towns the prices had been lowered, the demand had gone up. So far as Acts of Parliament were concerned, he said that all gas companies got Acts of Parliament for themselves, and paid for them. They were given on the condition that they would do nothing in the way of overriding the rights of the public; and consequently, if a company from Glasgow went to Parliament—if it should come to that—and showed that gas could be made at 3s. 6d., while 5s. was paid for it, Parliament would interfere, and the two gas companies would go to the wall as they ought to do. (Laughter and applause.) The lecturer then referred to the wasteful expenditure of money on the part of the gas companies in extending their mains to districts beyond the boundaries of the city, deprecating the practice as one which virtually was robbing Peter, the townspeople, to pay Paul, the expense of taking gas to the out-districts. (Laughter and applause.) In other towns the inhabitants of districts three or four miles from a city never grudged to pay extra for their gas. Here, however, the city consumers paid the high rate that the gas companies might lay out large sums of capital in carrying the gas to out-districts. The lecturer then explained the system of making gas, illustrating his remarks by a large diagram, and showing that by the use of five retorts, instead of two, as at present, a large amount of coke might be saved. He then referred to the false construction of the gas-meters, remarking that a day or two ago a bill had

Price Current.

CASTINGS, PER TON.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	3 15 0	2 14 6	3 5 0	3 5 0	3 10 0
1½ and 2 inches Socket-Pipes	7 0 0	6 0 0	6 5 0	6 10 0	6 15 0
2½ and 3 ,, ,,	6 10 0	5 10 0	5 15 0	6 0 0	6 5 0
4 and 5 ,, ,,	6 0 0	5 0 0	5 5 0	5 10 0	5 15 0
6 in. and upwards ,,	5 15 0	4 15 0	5 0 0	5 5 0	5 10 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 15 0	5 0 0	5 5 0
,, 2nd ,, cold ,,	6 10 0	5 5 0	5 10 0	6 0 0	6 5 0
Tank Plates, ¼ thick and above	6 0 0	5 0 0	5 5 0	5 10 0	5 10 0

WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., perft.	1 8	1 0	0 10	0 7	0 5	0 4½
,, ,, ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
,, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Plain Sockets [Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Syphons, 2 quart	1 0	0 8	0 7	0 5	0 4	0 3
	15 0	14 0	13 6	13 0	12 0	—

COALS, PER TON.

Newcastle.—Unscreened.		*Scotch Cannel.*	
Whitwell Primrose	6s. 3d.	Boghead, at Leith	45s. 0d.
Medomsley, Eighton Moor, and Burnhope	6 6	Kirkness, best	23 0
Pelaw	6 9	Capeldrae, 1st quality	20 0
New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth	7 0	,, 2nd ,,	12 6
Pelton	7 9	Lesmahago, at Glasgow	25 0
Ramsay's Newcastle Cannel	16 0	,, ,, Leith	27 6
		Arniston	22 0
		Wemyss	20 0
		Knightswood	18 0
		Pirnie	15 0

SUNDRIES.

Best Newcastle Fire-bricks	per 1000	50s. 0d.	
Cliff's Fire-bricks, at Wortley	per 1000	57 6	
Ingham's Fire-bricks, at Wortley	,,	55 0	
Fire-clay Retorts	per foot run, 3s. 6d. to	7 0	
Tough Cake Copper	per ton	£107 10s.	
English Pig Lead	,,	22 10	
Welch Bar Iron, in London	,,	6 17 6	
Tarred Rope Yarn	per cwt.	26s. 0d.	
Foreign Spelter	per ton	£21 0 0	
English Block Tin	,,	136 0 0	
Banca	,,	144 0 0	

FREIGHTS.

Coastwise—Newcastle.—Per Ton.		*Foreign.—Per Keel.*	
Chatham & Rochester	5s. 9d.	Boulogne and Calais	£7 15 0
Cork	—	Barcelona	24 5 0
Dover	6 3	Bordeaux	16 0 0
Dublin	9 3	Cadiz	18 0 0
Exeter Quay	10 3	Copenhagen	9 0 0
Folkestone	6 9	Dieppe	8 17 6
London (Wharf)	5 9	Genoa	22 0 0
Lowestoft & Yarmouth	5 3	Hamburg	7 12 6
Lynn	—	Havre	8 17 6
Portsmouth	8 0	Leghorn	22 0 0
Plymouth	8 9	Lisbon	£19 to 20 0 0
Ramsgate	8 3	Rotterdam	7 5 0
Whitstable	7 0	Stettin	11 0 0
Weymouth	—	Trieste & Venice	£24 to 26 0 0

been passed through Parliament rendering gas companies using false meters liable to be prosecuted as for any other fraudulent purposes. He then showed how they might regulate these meters, so as to protect their own pockets, remarking before he did so that he had, since he came to Glasgow, inspected thousands of meters, and the result of his inspection had been that while the Suburban Gas Company used properly constructed meters, the old company had those which the new Act of Parliament was intended to remedy. In compliance with a request of the gas consumers he had made very careful calculations, from which it appeared that the greatest cost of producing gaslight in Glasgow ought not to exceed 1s. 11d. per 1000 feet, and that would be allowing for the cost of manufacture, loss by leakage, and bad debts. Adding to this 1s. per 1000 feet to provide 10 per cent. interest on the capital of the shareholders, and 5 per cent. on the mortgaged capital, the gas ought to be provided to the consumers at not more than 2s. 11d. per 1000 feet. The Lesmahago coal, which was used by the Glasgow Company, was taken to cost 24s. per ton; but in the discussion in the Trades' Hall, it had been elicited that cannel coal was obtained for 12s. 8d. per ton, which would reduce the original cost of the gas to 1s. 0½d. per 1000 feet. The lecturer concluded by referring to the fact that London, after taking coal from Newcastle, and even Scotland, was able to supply gas cheaper than it was supplied for in Glasgow. (Applause.)

A long discussion then ensued, commenced by Bailie Mitchell stating that by putting in meters and service-pipes into the houses free, the Suburban Gas Company, in which he was a shareholder, supplied gas virtually at 3s. 9d. per 1000 feet. At this result he arrived by deducting 15 per cent., which he said was allowed to large consumers from 5s., and then deducting the amount allowed for meter and service-pipes, which were paid for in England by the consumers. As to the quality of the gas, the Town Council had the power at any time they chose to send a man to test the gas, and any scientific man that wished to test it, whether sent by the council or not, would be made welcome to do so. In reply, Mr. Flintoff stated that he could not approve of giving 15 per cent. discount to the large consumers, and not to the small as well; and, as to the service-pipes, as much was required for one house in Scotland as for three in England. In reply to the chairman, Bailie Mitchell said he was not aware of the number of consumers to whom 15 per cent. discount was given. After some irrelevant and stormy discussion, Mr. Melvin stated that instead of deducting the income-tax from the dividends of the shareholders, as in other companies, the Suburban Gas Company had in 1856, besides paying 10 per cent. on the invested capital, paid £1126 of income-tax, and in 1858, £47. 16s. 3d. Several other speakers followed, all of them going in against the present system of the gas companies, apparently anxious for some reform therein—views which were applauded most enthusiastically by the meeting. A vote of thanks to the chairman terminated the proceedings.

PATENT FLEXIBLE GAS TUBING,
VULCANIZED INDIARUBBER HOSE-PIPES,
WASHERS, PACKING, &c.

JAMES LYNE HANCOCK begs to announce a considerable REDUCTION in PRICE of his PATENT VULCANIZED INDIARUBBER TUBING.

VULCANIZED INDIARUBBER AIR-TIGHT BAGS, any size, for Gas Mains, with flexible tubes attached, and fitted with stop-cocks complete.

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CAST-IRON Retorts, Socket Pipes, with Syphons and all requisite Connexions, Lamp Columns, Wrought Iron Tubing, Valves, Street Lamps, Sight Holes, Furnace Doors, Ash Pans, Charging and Coke Shovels, Iron Pails and Coke Barrows, Cross Bars, Fire Pots, Pumps, Iron Borings.

PURIFIERS, CONDENSERS, and SCRUBBERS erected complete, or the materials supplied; with every description of goods in use by Gas-Works, in stock, on wholesale prices, at

Mr. LYNCH WHITE'S,
Old Barge Iron Wharf, Upper Ground Street,
LONDON.

WEST and GREGSON, Gas-Meter MANUFACTURERS, &c.
UNION STREET, OLDHAM.

Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

ALFRED PENNY, Engineer,
WENLOCK IRON WORKS,
WHARF ROAD, CITY ROAD, LONDON.

Mr. PENNY begs to inform Gas and Water Companies that he undertakes the erection of new, or the alteration of existing, works; and that he may be consulted generally on all matters connected with gas and water supply. He is also prepared to supply best Cold-blast Retorts, Socket-Pipes, and Connections, Iron Borings, &c. &c., and all the necessary Castings used in Gas and Water-Works.

*** Country orders executed with care and despatch.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn Hill, begs to inform Managers of Gas-Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

GEORGE ANDERSON, Gas and CONSULTING ENGINEER,
104, LEADENHALL STREET, LONDON (E.C.).

DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.

FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.

RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.

Illustrated circulars, giving references and every information, may be obtained on application as above.

GRANT AND CO.'S
PATENT COMPENSATING GAS-METER,

Which secures accuracy of registration by its maintaining a true water-line under every circumstance, by a simple contrivance which is not liable to get out of repair; requiring little attention, they being self-acting—as the water is again used that is left, after supplying what has been lost by evaporation.

GAS-METER WORKS: EDINBURGH.

EDWARD COCKEY & SONS'
PATENT GAS VALVES.

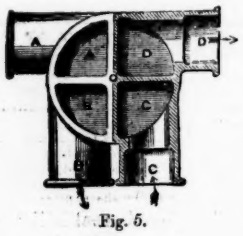


Fig. 5.

THESE Valves are formed of two cast-iron cylinders, with segmental divisions, having faces ground gas-tight, the upper cylinder turning horizontally on the lower one.

The lower cylinder has pipes from each division communicating with the vessels to and from which gas is to be passed. The upper cylinder has corresponding divisions, so arranged as to direct the passage of gas to the different segmental divisions in the lower part, and when it is turned on the face of the lower one to alter the flow of gas from one vessel to another.

Fig. 6.

Fig. 5 represents the Valve arranged for a bye-pass, in which, by turning the upper cylinder, Fig. 6, the Gas is directed either through the bye-pass, or through the vessel to which it is attached.

Another arrangement is just completed for two purifiers, by which the Gas may be directed through both purifiers together entering either first, or through either purifier separately. The advantages of this arrangement will be too manifest to Gas Manufacturers to need comment.

The Valves are manufactured by the Patentees at their

IRON WORKS, FROME SELWOOD.

The following Testimonial has been received from an eminent Engineer:—

Gaslight and Coke Company's Office, Cheltenham, Jan. 17, 1859.

Messrs. Cockey and Sons, Frome.

Gentlemen,—The Patent Purifier Centre Valve which I had fixed instead of the common hydraulic valve for one of our sets of purifiers with 9-inch connexions, I am happy to say continues to afford satisfaction both to myself and to the workmen who have the charge of it.

I am, Gentlemen, yours truly, W. ESSON.

EDWARD COCKEY AND SONS

ALSO MANUFACTURE

PURIFIERS, SCRUBBERS, CONDENSERS, AND OTHER IMPROVED GAS APPARATUS,

HAVING PATTERNS SUITABLE FOR GAS-WORKS OF DIFFERENT SIZES.

TO GAS COMPANIES AND CONTRACTORS.

FOR SALE, several lengths of HYDRAULIC MAIN, 14 inches diameter and 6 feet 9 inches long, with 7 holes for Dip-Pipes.

Also, 4-inch ASCENSION-PIPES, 3-inch ARCH and DIP PIPES, and D MOUTHPIECES, all in excellent condition, and will be sold at a very low price.

To be seen on application to the ENGINEER, at the Equitable Gas Company's Works, Lupus Street, PIMLICO.

GAS PURIFYING BY REVIVIFIABLE OXIDE OF MANGANESE.

MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) begs to inform Gas Engineers that they may now supersede the material in general use by A REVIVIFIABLE OXIDE OF MANGANESE of his preparing, which in efficacy is at least equal, and in economy superior, to Oxide of Iron. Owing to the greater chemical activity of Manganese, common dry-lime purifiers of ordinary capacity will often be amply sufficient for it, though they may be too small for the Oxide of Iron material.

For Gas-Works possessing steam power, more especially such as are exposed to public complaint, Mr. Laming recommends the purification to be done either wholly or in part (depending on extent of apparatus) in out-of-doors scrubbers, hermetically sealed, by means of his liquid process, which is both economical, and meets all practical requirements.

118, Fenchurch Street, Aug. 1, 1859.

WROUGHT-IRON Guides for Gas-HOLDERS, when Trussed upon scientific principles, are more capable of resisting strains, in every direction, than Cast Columns of any form can be; and weigh only one-fifth as much as the latter. Designs and Working Drawings for Guides and Ties can be obtained of the Inventor, CHARLES DIXON, C.E., Chichester, SUSSEX.

ALLAN and CO.'S Patent Compensating GAS-METER.

For Drawing and Description of this Meter see THE JOURNAL OF GAS LIGHTING, No. 176, of July 19, 1859, pp. 405, 406.

Application for information to be made to, and licenses granted by, ALEXANDER ALLAN, Engineer, PERTH, and the Meters may be had of JOHN MILNE, Maker, Milton House, EDINBURGH.

TO be Sold, a Bargain, a Gasholder of 5000 cubic feet capacity, in good condition.

Apply to Mr. ALFRED BARTON, Secretary to the Cowes Gas and Coke Company.

GEORGE WHITE, Boiler and GASHOLDER WORKS,
WITTON'S LANE, WEST BROMWICH.

Contracts for Steam and Range Boilers of every description, Gasholders, Tanks, Roofs, Purifiers, and every description of Iron Works for Gas-Works, of best material and workmanship.

EIGHTON MOOR GAS COALS.—Parties wishing to be supplied with these first-class Gas Coals will please to apply to Mr. MATTHEW NESBIT, EIGHTON MOOR OFFICE, NEWCASTLE-UPON-TYNE. These coals are well known as among the richest in gas, and working the roundest on the River Tyne. They are extensively used by metropolitan gas works.

WILLIAM CLIBRAN'S Patent MERCURIAL GAS-GOVERNOR FOR STREET LAMPS.

W. C. begs respectfully to call the attention of Gas Companies to his PATENT GAS-GOVERNOR for STREET LAMPS, upwards of 3000 of which are now in use on Public Lamps. By their use any given quantity of Gas per hour may be consumed with the tap full open whatever the increase of pressure may be, thus preventing a great waste of Gas in many of the Lamps, and securing to the public an uniform light. Prices, 3s. 4d., 3s. 6d., and 3s. 8d. each.

Governors kept in stock from three-eighths of an inch to four inches bore.

Samples and Testimonials forwarded on application to WILLIAM CLIBRAN, 43, Todd Street, MANCHESTER

BENJAMIN GIBBONS, Jun.,
DEEPDALE FIRE-CLAY & BRICK WORKS,
Near DUDLEY,

Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.

FIRE-CLAY RETORTS,
TO MODEL OR DRAWING.

B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.

References given, if required.

WHITEHOUSE and CO., Boiler and GASHOLDER MAKERS,
GLOBE PATENT TUBE WORKS,
WEDNESBURY,

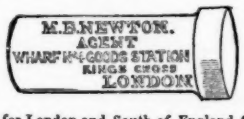
Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.

Orders promptly executed.

THOMAS PHILLIPS,
55, SKINNER STREET, SNOW HILL.

PATENTEE and MANUFACTURER of all kinds of Apparatus for Cooking, Heating Baths, Conservatories, &c., by Gas, and general Gas-Fitter by Appointment.

J. CLIFF'S Fire Bricks, Clay RETORTS, &c.



Orders for London and South of England to be addressed to Mr. NEWTON, Agent for the District, 16, Castle Terrace, New Hampstead Road, KENTISH TOWN, N.W.

N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

ESSON'S Patent Compensating GAS-METER

Affords ABSOLUTE SECURITY both to Gas Companies and Consumers by maintaining a CONSTANTLY ACCURATE WATER-LEVEL UNDER ALL CIRCUMSTANCES, by means so simple and effective as to baffle and remove those objections which have been successfully urged against other complicated contrivances professing the same object.

Manufactured only by
W. COWAN,
BUCCLEUCH STREET WORKS,
EDINBURGH;
AND
COMMERCIAL CHAMBERS,
RIDINGS COURT, ST. MARY'S GATE,
MANCHESTER.
Established 1827.

CHARLES BOTTEN and SON, ENGINEERS & METER-MAKERS,
CRAWFORD PASSAGE, RAY STREET,
CLERKENWELL, LONDON (E. C.).

Manufacturers of Station and Patent Protector Consumers' Meters, Patent Slide-Valves, Gas-Fittings, Pipes, &c.

Also, High-pressure Cocks, Hydrants, Closets, and all Water-Fittings.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

WILLIAM RYDER, General MINERAL AND METAL AGENT AND MERCHANT, 4, DEAN STREET,
NEWCASTLE-ON-TYNE,

is prepared to supply Gas and Water Companies with Apparatus and Appliances of every description, including Cast and Wrought Iron Goods, Coals, Fire-Bricks, Retorts, &c. &c.

Any communications addressed to him as above shall have prompt attention.

WILLIAM STEPHENSON & SONS, THROCKLEY,
NEWCASTLE-ON-TYNE,
MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE BRICKS, CLAY RETORTS, LUMPS, TILES,
&c. &c.

LONDON OFFICES:
76, KING WILLIAM STREET, CITY.

A large stock of Fire-Clay Goods always on hand in London, at the lowest wharf prices, at Messrs. CHRISTIE & Co.'s Wharf, 64, Bankside, SOUTHWARK.

JOHN ROGERSON and CO.,
NEWCASTLE-ON-TYNE & MIDDLESBRO'-ON-TEES.

Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.

SOUTH METROPOLITAN GAS-LIGHT AND COKE COMPANY.

NOTICE is hereby given, that an EXTRAORDINARY MEETING of the PROPRIETORS of this Company will be held at the London Tavern, in the City of London, on WEDNESDAY, the 21st day of September next, at Two o'clock precisely, to elect an Auditor, in the place of Benjamin Edgington, Esq., who is now a Director.

Any Proprietor, holding 40 shares, intending to become a Candidate must give notice in writing, at the Office of the Company, at least Fourteen days previously to the day of Election.

By order of the Directors,
THOMAS LIVESEY, Secretary.

Old Kent Road, Aug. 30, 1859.

N. B.—"Votes may be given either personally or by proxy; but no Shareholder is entitled to vote as a proxy unless the instrument appointing such proxy is transmitted to the Secretary two days before the holding of the Meeting at which such proxy is to be used;" nor is any person allowed to "represent as proxy more than five shareholders."

TO GAS & WATER COMPANIES, ENGINEERS AND FITTERS.

GARSIDE'S Registered Tube-Vice holds all sizes of Wrought-Iron and Brass Tubes with the greatest firmness and least possible pressure; consequently it is not so liable to split or damage the Tubes as the ordinary Vice, and considerably facilitates the Workman, who may do almost double the quantity of work. Also,

GARSIDE'S IMPROVED MAIN-DRILLING CLIPS, for Drilling Holes for Service-Pipes. With this instrument the perforation of Pipes for the attachment of smaller Tubes can be effected with great ease and precision. Likewise,

HEAP'S REGISTERED GAS TONGS, most highly approved of as vastly superior to those in present use. Stocks, Taps, and Dies, together with all tools connected with Gas Engineering.

For Drawings, Testimonials, and prices, apply to the Maker, S. GARSIDE, Stamford St., ASHTON-UNDER-LYNE.

KINSON FIRE BRICKS are indestructible by heat, and are warranted to last twice as long as Stourbridge, Newcastle, or Welsh bricks. 80s. per 1000 at Nine Elms Station.

WORKS: POOLE, DORSET.

WALTER MABON, Engineer, ARDWICK IRON WORKS, FAIRFIELD STREET
MANCHESTER,
Manufacturer of

IRON TANKS for Gasholders, Railway Stations, &c.

GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.

GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contractor for Gas Works of any Magnitude. Designs, Specifications, and Estimates furnished.

WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.

IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.

PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

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VOL. VII. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1858, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., V. and VI. are still on sale.

W. B. KING, 11, Bolt Court, Fleet Street.

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Just Published,

A FULL Report of the Proceedings on the ARBITRATION between A. A. CROLL, Esq., and the GREAT CENTRAL GAS CONSUMERS' COMPANY. Before C. MAY, Esq., C.E., F.R.S., and THOMAS G. BARLOW, Esq., C.E., Arbitrators, and C. HOGGINS, Esq., Q.C., Umpire.

Reprinted from the *Journal of Gas Lighting, Water Supply, and Sanitary Improvement.*

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A few Copies are on Sale, bound up with the Proceedings before the Parliamentary Committee on the Company's Bill in 1850—price 7s. 6d.

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Price 1s.; by Post, 1s. 1d.

Also, uniform with the above, price 2s.,

A REPORT of the Appeal of the Cam-BRIDGE GASLIGHT COMPANY *versus* the GUARDIANS of the CAMBRIDGE UNION, heard at the BOROUGH SESSIONS on Saturday, January 8, and Friday, January 14, 1859.

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(As per Analyses.)

GAS CANNEL, 17s., 15s. 6d., and 14s. per ton.
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STEAM COAL, 10s., 9s. 6d., and 9s. per ton.
All free on board Vessels in Liverpool.

Handpicked Cannel and Coal about 10 per cent. additional. Concession in prices made for large quantities.

GAS APPARATUS of all descriptions, and on the most approved principles; also Purifying and other materials supplied.

ANALYSES, PLANS, and ESTIMATES, and other information required, and the highest references furnished on application.

CONTRACTS for Materials and Works entered into.

No charge made for Superintending Shipments, Preparing Bills of Lading, or passing Entries.

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EXPORT OFFICES:
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ALEXANDER WRIGHT,

GAS ENGINEER, MANUFACTURER OF GAS-METERS, GOVERNORS, AND EVERY DESCRIPTION OF GAS APPARATUS,
55, MILLBANK STREET, WESTMINSTER.
CONSUMERS' METERS at the List Price, with a Liberal Discount to Wholesale Purchasers.
THOMPSON'S BROMINE TEST, £1. 1s.—BROMINE, 3s. per Ounce.
BISULPHURET OF CARBON TEST, £2. 2s.
APPARATUS FOR DETERMINING THE HEATING POWER OF SAMPLES OF COAL AND OTHER DESCRIPTIONS OF FUEL, £5. 5s.,
INVENTED BY LEWIS THOMPSON, ESQ., M.R.C.S.
REGISTERING PRESSURE GAUGE, Net Price, £8. Glass Shade, 10s. extra.
STATION METERS, PRESSURE GAUGES, PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, &C.

LORD REDESDALE'S "SALE OF GAS BILL" having received the sanction of the Legislature, Gas Companies and Consumers are respectfully informed that **ALL** Meters made at this Establishment will be constructed most carefully to meet the requirements of this Act.

WRIGHT'S COMPENSATING METER possesses peculiar claims on the attention of those who desire to obtain a most simple and thoroughly efficient instrument at a moderate price.

WILLIAM PARKINSON AND CO.,

(SUCCESSORS TO THE LATE SAMUEL CROSLEY,)
COTTAGE LANE, CITY ROAD LONDON,
Beg to announce that, in addition to the Manufacture of
G A S - M E T E R S,
they continue the Manufacture of
METERS FOR MEASURING WATER, SPIRITS, &c.,
commenced, under Patent in 1849, by the late Mr. William Parkinson.

These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

By Her Majesty's Royal Letters Patent.

JAMES MEACOCK,

PATENT DRY and IMPROVED WET GAS-METER WORKS,
7, SNOW HILL, AND 16, WEST STREET, LONDON.
ESTABLISHED 1836.

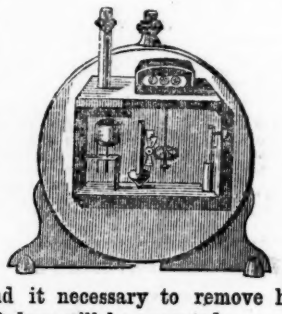
J. MEACOCK begs to call attention to his patent method of securing the Leather diaphragm of his Dry Meter. Instead of using the soldering iron for this purpose, it is held between two flat Metal Rings, and screwed up sound to a metal frame, as shown in the drawing.

By this improvement the perishing effect of hot tools to leather being avoided, its durability must be longer; also, its repair when needful is most simple, as a new leather diaphragm can be applied by merely unscrewing the old one from the rim or frame to which it had been screwed up.

Meters of Gas Companies being subject to so much wear and tear, J. M. begs leave to assure those who may honour him with their commands, that nothing but the stoutest materials for cases, the hardest gas-resisting metals, and best foreign leather for the interiors, will be used, and none but first-class workmen employed in their construction.

Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

METERS SENT ON APPROVAL.



In consequence of the great demand for the above Meters, J. Meacock has found it necessary to remove his Manufactory to more extensive Premises, 16, West Street, Smithfield, where Orders will be executed on the shortest notice.

BOULTON'S PATENT
DRY GAS-METERS,

Of which upwards of 24,000 are at present in use, having gained for themselves an unparalleled patronage from all the principal Gas Companies and Consumers, on account of their unerring registration and the superior workmanship and materials used in their construction, enables the Patentee to sell them now at competitive prices with those of other makers.

Every description of Improved Wet or Patent Dry Meters and Gas Apparatus manufactured by

JOSEPH BOULTON
28, BAGNIGGE WELLS ROAD, CLERKENWELL.

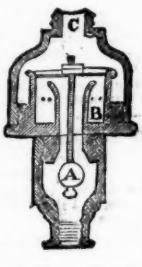
THE UNIVERSAL
GAS-BURNERS REGULATOR,
(GEYELIN'S PATENT,)

The only one in the world by which the flame from Argand, Fish-tail, and all other Burners remain invariable under all variations of pressure, and the cost of each light is less than one farthing per hour.

Can be fixed horizontal, close to, or distant from, the Burner; is ornamental, simple in construction, consisting of a double chamber, the inner perforated, covered with a diaphragm giving action to a spherical valve.

PRICE 3s. EACH.

Can at all times be seen tested at the Manufacturer's,
JOSEPH BOULTON
28, BAGNIGGE WELLS ROAD.



JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast Iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, Lamp Columns of various patterns, &c.

N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.

CHARLES HORSLEY, Agent.

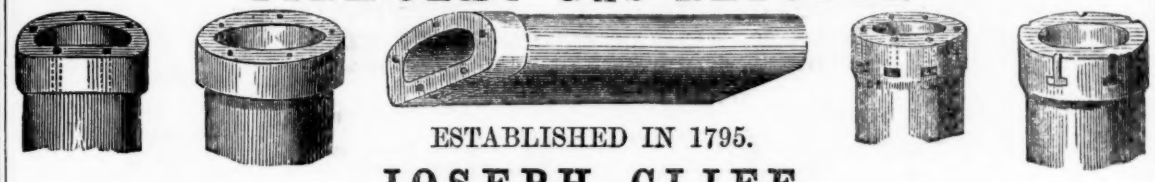
C. H. is prepared to carry out the warming and ventilation of public buildings, &c.; also civil engineering in general.

F. & C. OSLER,
44, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.

ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards (Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.

THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

FIRE-CLAY GAS RETORTS.



ESTABLISHED IN 1795.

JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. - From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

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PADDON and FORD respectfully invite the attention of Gas Companies and Managers to their PATENT STREET LAMP REGULATOR, which ensures any required consumption.

By its use a great saving is effected, and the item of "Unaccounted-for Gas" considerably decreased.

PADDON and FORD, Patent GAS-METER AND APPARATUS WORKS, GRAY'S-INN-ROAD, LONDON,

Manufacturers of WET and DRY GAS METERS, STATION METERS, GOVERNORS, EXPERIMENTAL APPARATUS, LANTERNS, &c. &c.

Contractors for the erection or alteration of Gas-Works; and every description of Apparatus required in Gas-Works supplied.

GEORGE CUTLER, Gasholder MAKER,

No. 8, WENLOCK-ROAD, CITY-ROAD, LONDON.

Contracts for Tanks, Gasholders, Roofs, Purifiers, and all descriptions of Gas Apparatus executed on the most reasonable terms. Improved Slide Valves, Steam, and Range Boilers, and Smiths' Work, of the best materials and workmanship.

"ALL DOUBTS REMOVED."

DEFRIES' celebrated Dry Gas-METERS, of which there are 80,000 in use in Palaces, Churches, Chapels, Royal Dock-yards, Club Houses, Public Offices, and other buildings throughout the Empire, the Continent, and Colonies.

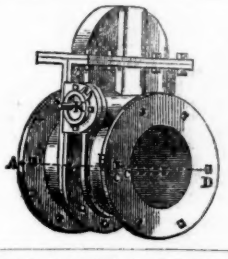
His meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that building was destroyed by fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company and found inflexibly correct.

On the 9th of June, 1858, at the Western Gas Company, his meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests, from the full lighting down to a single jet, and in each case, as in numerous other instances, accuracy was finely indicated.

His two large meters at the Thames Tunnel have been in constant use day and night for upwards of twelve years (one continuation of dark hours), subjected to the wear and tear of 75 years, as compared with the ordinary hours of using gaslight above ground.

Gas Companies honouring Mr. Defries with their commands for his PATENT DRY METER, which has done so much service in simplifying the fitting up of gas, as well as checking surreptitious burning, will be guaranteed perfection for five years free of charge.

Defries' Prize-Medal Gas Baths, Gas-Cooking and Heating Stoves. The Polytechnic Gas Fire, with indestructible fuel, in daily operation (Saturday excepted) at the Office, 406, Euston Road, Fitzroy Square, LONDON.



BRYAN DONKIN & CO.

keep always on stock their

IMPROVED GAS VALVES

from 2 inches to 18 inches, price 11s. 6d. to 13s. 6d. per inch diameter

List of prices, with full dimensions of all sizes up to 27 inches, to be had on application.

These Valves are all proved to 30 lbs. on the square inch before leaving the works.

BRYAN DONKIN & CO.,

ENGINEERS,

NEAR GRANGE ROAD, BERMONDSEY.

BIRTLEY IRON WORKS, CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas Works and Water Works.

Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

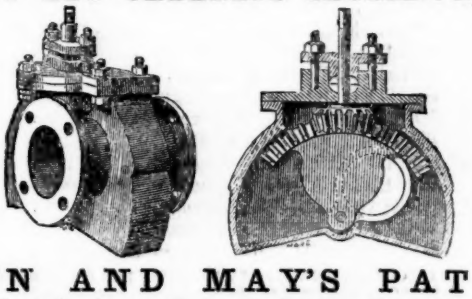
Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

HARRIS and PEARSON PROPRIETORS OF BEST CLASS-HOUSE POT AND CRUCIBLE CLAY. MANUFACTURERS OF **FIRE BRICKS GAS RETORTS &C.**

AMBLECOTE FIRE CLAY AND BRICK WORKS, STOURBRIDGE.

Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

BEST AND CHEAPEST SLUICE-COCK.



BROWN AND MAY'S PATENT.

Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.

Can be taken to pieces without being removed from the line of Piping.

NORTH WILTS FOUNDRY, DEVIZES.

Wholesale Agents, Messrs. S. and E. RANSOME, 31, Essex Street, Strand, E.C., Where a Sample may be seen.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

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W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents: CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.—Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

WILLIAM SUGG,

GAS ENGINEER, AND GENERAL GAS APPARATUS MANUFACTURER,

19 and 20, MARSHAM STREET, WESTMINSTER.

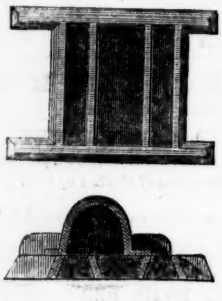
WATER and DRY GAS-METERS, with all the latest improvements.
Improved GOVERNORS of all kinds.
STATION-METERS of first-class quality.
PHOTOMETERS, PRESSURE-GAUGES, TEST-METERS, GASHOLDERS, &c.
GOVERNORS for Street Lamps, 36s. per dozen.
STREET-LAMP LAVA BURNERS, cased in Brass, 24s. per gross—to burn 2½, 3½, 4, and 5 feet per hour.
Argand, Sun-Ring, Photometer, and all kinds of Burners in Lava.

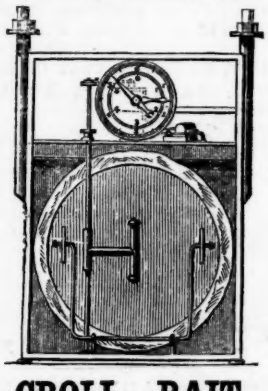
CROLL'S

PATENT IMPROVED DRY GAS-METER,

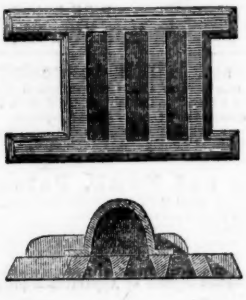
In every respect meets the requirements of "THE SALE OF GAS BILL," and will register accurately the smallest jet.

NEW VALVE.





OLD VALVE.



Manufactured by CROLL, RAIT, and CO., LONDON.

FACTORY—Canal Bridge, Kingsland Road, N.E.

Messrs. CROLL, RAIT, and Co. having stated that the New Valve is an improvement to Mr. CROLL'S DRY GAS-METER, have much pleasure in supporting that statement by the opinion of practical men. They have authority to say that the following gentlemen, connected with the London Gas Companies, consider the alterations lately made, *especially those affecting the Valves*, to be important improvements therein.

GEORGE LOWE, F.R.S., Consulting Engineer to the		Chartered Gas Company.
WILLIAM MANN, Engineer	,,	City of London Gas Company.
ROBERT JONES, Engineer.	,,	Commercial Gas Company.
HUNTER JONES, late Engineer	,,	Equitable Gas Company.
JOSEPH CLARK, Engineer	,,	Imperial Gas Company.
THOMAS KIRKHAM, Engineer . . .		
DAVID METHVEN, Engineer		
ROBERT LAING, Engineer and Secretary. .	,,	Independent Gas Company.
RICHARD JONES, Engineer	,,	London Gas Company.
WILLIAM INNES, Engineer	,,	Phœnix Gas Company.
GEORGE WILTON, Resident Engineer . .	,,	Ratcliff Gas Company.
THOMAS LIVESEY, Engineer and Secretary.	,,	South Metropolitan Gas Company.
DAVID HUNTER, Jun., Resident Engineer .	,,	Surrey Consumers' Gas Company.

This opinion is also confirmed by

JOHN KIRKHAM, Civil and Consulting Gas Engineer.
R. M. CHRISTIE ,, ,,
THOMAS G. BARLOW ,, ,,

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE, BLACK & GALVANIZED. COPPER. TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—60s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Joseph Clayton, 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Aug. 30, 1859.